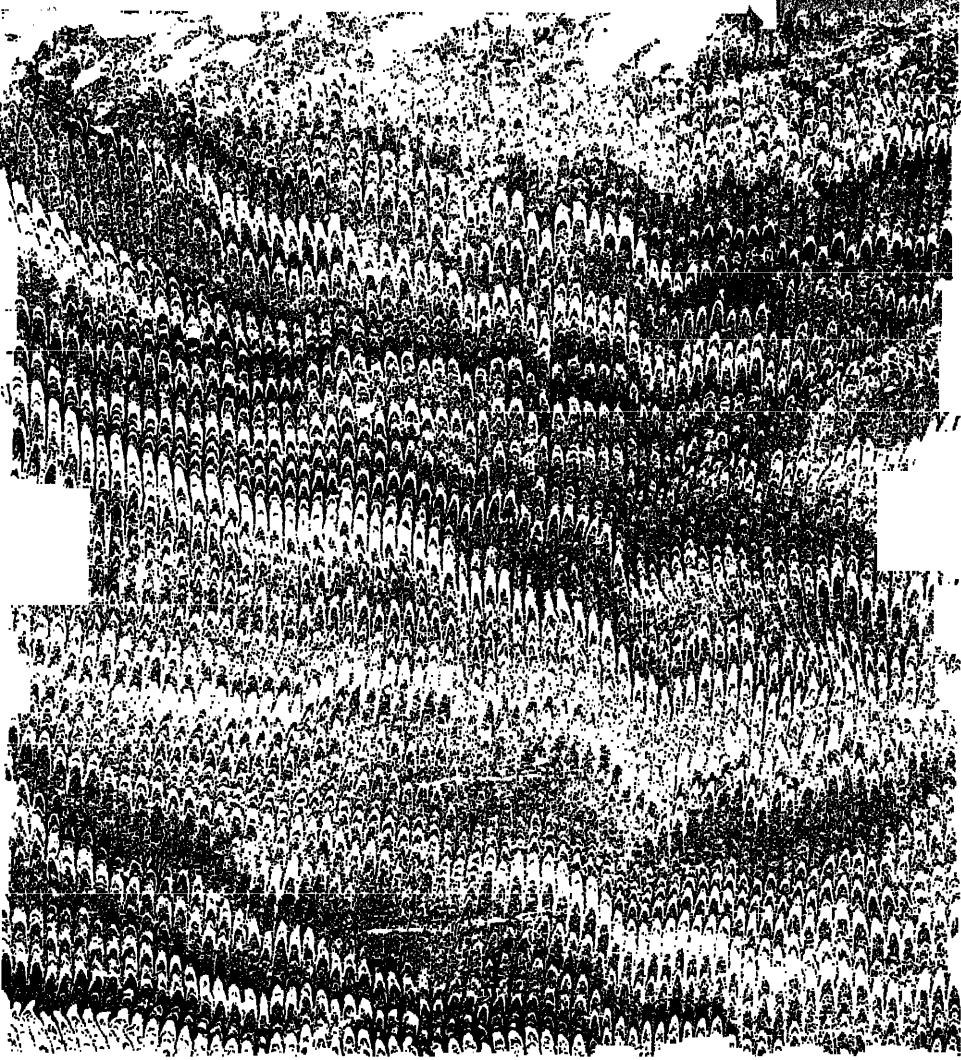
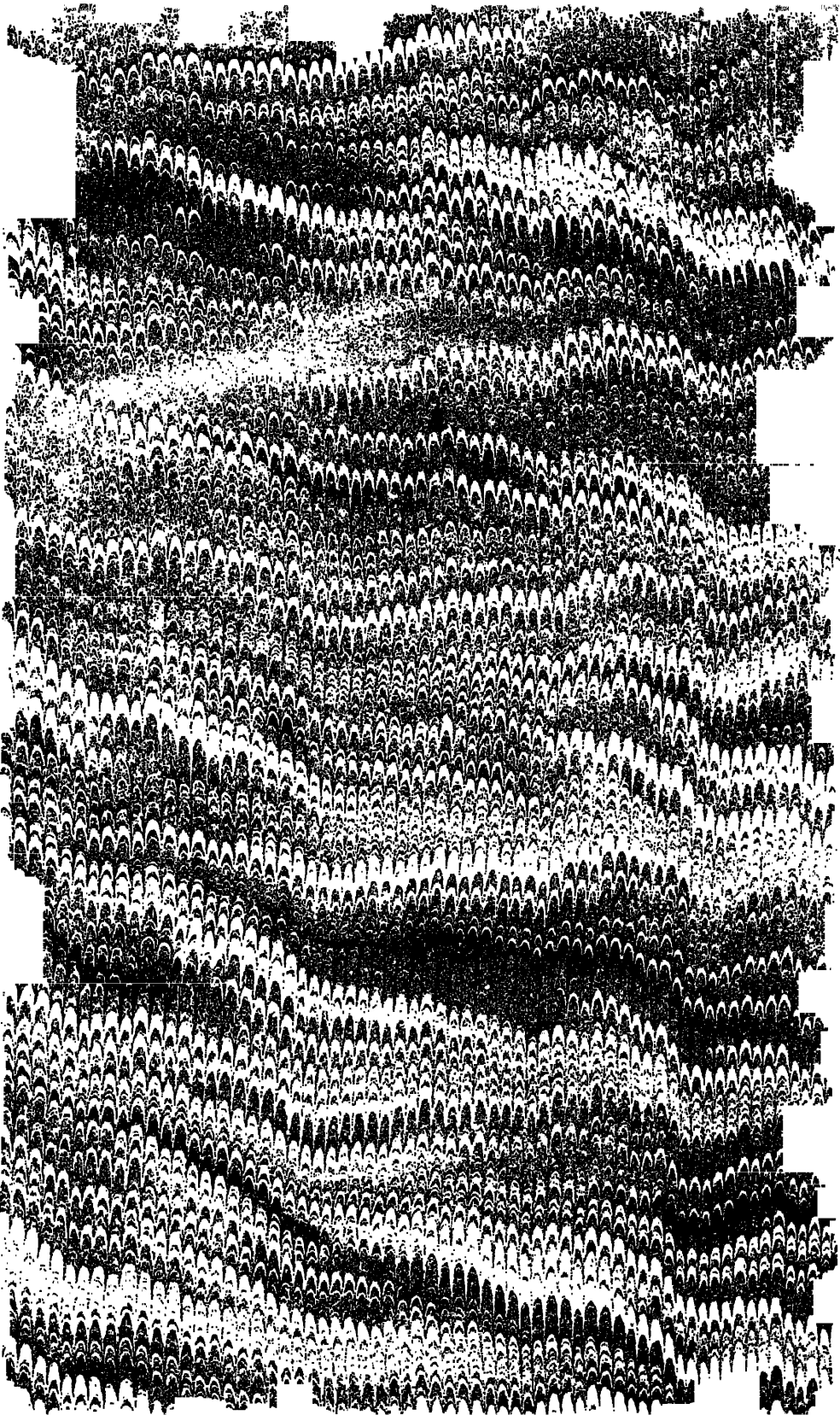


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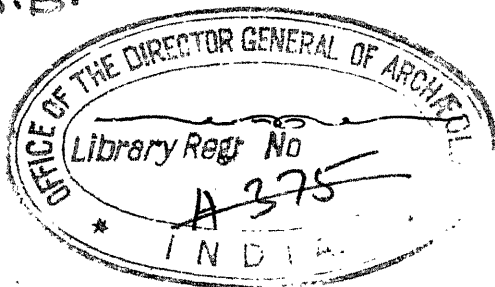
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## CONTENTS.

---

	<i>Page</i>
Proceedings for January 1877, .....	1-24
Do. for February, including Annual Report, .....	25-66
Do. for March, 1877,.....	67-90
Do. for April, „ .....	91-112
Do. for May, „ .....	113-130
Do. for June, „ .....	131-154
Do. for July, „ .....	155-180
Do. for August, „ .....	181-200
Do. for November, „ .....	201-248
Do. for December, „ .....	249-274
Index,.....	275-291
List of Members of the Asiatic Society of Bengal on the 31st December, 1876, Appendix to February Proceedings, .....	i
Abstract Statement of Receipts and Disbursements of the Asiatic Society of Bengal for the year 1875, Appendix to February Proceedings, .....	xv
Meteorological Observations for January to March 1877.	

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## LIST OF PLATES.

---

- I.—Facsimile of a copper-plate grant from Pandukeswara, (p. 71).
  - II.—Ancient Pottery, &c., from Baluchistan, (p. 157).
  - III.—Prof. Graham Bell's Telephone, (p. 252).
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# ERRATA

IN

PROCEEDINGS, ASIATIC SOCIETY OF BENGAL, FOR 1877.

---

- Page 5, line 4 from bottom, *for* conquer *read* conquer.  
" 46, " 22 from top, *for* P. H. D. *read* P. W. D.  
" 52, *for* footnote, *read* \* about £ 480.  
" 54, line 13 from bottom, *for* commom *read* common.  
" 54, " 3 from bottom, *for* denymphe *read* de nympe.  
" 66 is wrongly numbered 62.  
" 69, line 7 from top, *for* Crawford *read* Crawford.  
" 76, " 24 from top, *for* excess *read* excess.  
" 76, " 3 from bottom, *for* Shisticeps *read* schisticeps.  
" 80, " 8 from bottom, *for* Waugton *read* Wangtu.  
" 131, " 2 from top, *for* 6th April *read* 6th June.  
" 134, " 6 from top, *for* nnder *read* under.  
" 139, " 23 from top, *for* specifics *read* specifies.  
" 150, " 7 from top, *for* June *read* May.  
" 195, " 2 from bottom, *for* Monogamy *read* Polygamy.  
" 257, " 2 from bottom, *for* the volume *read* volume XLIII, part 1.
-

[APPENDIX.]

LIST OF MEMBERS  
OF THE  
ASIATIC SOCIETY OF BENGAL.  
ON THE 31ST DECEMBER, 1876.

## LIST OF ORDINARY MEMBERS.

The \* distinguishes Non-Subscribing, the † Non-Resident Members,  
and the ‡ Life-Members.

N. B.—Gentlemen who may have changed their residence, since this list was drawn up, are requested to give intimation of such a change to the *Secretaries*, in order that the necessary alterations may be made in the subsequent edition. Errors or omissions in the following list should also be communicated to the *Secretaries*.

Gentlemen who are proceeding to Europe, with the intention of not returning to India, are requested to notify to the *Secretaries*, whether it be their desire to be removed from the list of the Society, otherwise, in accordance with Rule 40 of the Bye-laws, their names will be removed from the list at the expiration of three years from the time of their leaving India.

Date of Election.		
1860 Dec.	5.	Abdul-Latíf Khán Bahádúr, Maulawí. Calcutta
1868 Sept.	2.	†Adam, R. M., Esq. Agra
1860 July	4.	†Ahmad Khán Bahádúr, Sayyid, c. s. i. Benares
1872 April	3.	†Ahsan-ullah, Nawáb. Dacca
1860 April	4.	†Aitchison, J. E. T., Esq., M. D. Jullundur
1866 Jan.	17.	*Allan, Lieut.-Col. A. S. Europe
1871 June	7.	†Alexander, J. W., Esq. Darbhanga
1860 Oct.	3.	Amír Alí Khán Bahádúr, Nawáb. Calcutta
1874 June	3.	Amír Alí, Sayyid, Esq. Calcutta
1865 Jan.	11.	Anderson, Dr. J., F. L. S. Calcutta
1872 June	5.	†Anderson, A. Esq. Fatehgarh
1875 June	2.	Apcar, J. G., Esq. Calcutta
1875 Feb.	3.	Armstrong, J., Surg., B. Army. Calcutta
1871 Sept.	6.	*Atkinson, E. T., Esq., c. s. Europe [ana.
1869 Feb.	3.	†Attar Singh Bahádúr, Sirdár. Bhadour, Ludi-
1870 Feb.	2.	†Baden-Powell, B. H., Esq., c. s. Lahore
1873 Aug.	6.	†Badgley, Capt., W. F. Shillong
1859 Aug.	3.	Balaichánd Sinha, Bábu. Calcutta
1865 Nov.	7.	†Ball, V. Esq., M. A., Geol. Survey. Geol. S. Office
1860 Nov.	1.	Banerjea, Rev. K. M., LL. D. Calcutta
1876 June	7.	Baness, J. F., Esq. Calcutta
1869 Dec.	1.	*Barker, B. A., Esq., M. A. Europe
1873 March	5.	*Barclay, G. W. W., Esq., M. A. Europe
1860 July	4.	Batten, G. H. M., Esq., c. s. Calcutta
1859 May	4.	Bayley, E. C., The Hon. Sir, B. C. S., K. C. S. I. Calcutta
1873 Feb.	5.	Bayne, R. R., Esq., B. A. Calcutta
1864 Sept.	7.	†Beames, J., Esq., B. C. S. Cuttak
1841 April	7.	*Beaufort, F. L., Esq., B. C. S. Europe

Date of Election.		
1876 June 7.	†Behrendt, J., Esq.	Patna
1867 July 3.	Belletty, N. A., Esq.	Calcutta [ces
1862 Oct. 8.	*Bernard, C. E., Esq., c. s.	Central Provin-
1872 Aug. 7.	Beverley, H., Esq., c. s.	Calcutta
1876 Nov. 15.	†Beveridge, H., Esq., c. s.	Rangpur
1864 Nov. 2.	Bhudeva M. V. B. u.	Chinsurah
1874 Nov. 4.	Bhagabat: C. V. B. u., Bábu.	Calcutta
1875 July 7.	†Black, F. C., Esq.	Hamirpur
1873 Dec. 3.	Blackburn, J., Esq.	Calcutta
1857 Mar. 4.	Blanford, H. F., Esq., A. R. S. M., F. G. S.	Calcutta
1859 Aug. 3.	†Blanford, W. T., A. R. S. M., F. R. S., F. G. S.	Geol. S. Office
1873 Aug. 6.	†Bligh, W. G., Esq.	Mathurá
1873 April 2.	†Blissett, T., Esq.	Dacca
1864 April 6.	Blochmann, H., Esq., M. A.	Calcutta
1876 Nov. 15.	†Bowie, Major, M. M.	Sambhalpur
1868 Jan. 15.	†Boxwell, J., Esq., c. s.	Dumka
1876 May 4.	†Bradshaw, A., Surgeon Major.	Simla
1860 March 7.	†Brandis, Dr. D.	Simla
1872 June 5.	*Brooks, W. E., Esq., c. E.	Europe
1871 Jan. 4.	Brough, R. S., Esq.	Calcutta
1866 Nov. 7.	†Browne, Col. Horace A.	Rangoon
1874 April 1.	Bruce, W. D., Esq., c. E.	Calcutta
1871 Sept. 6.	†Buckle, H., Esq.	N. Arracan
1869 Jan. 20.	†Cadell, A., Esq., B. A., c. s.	Banda
1863 June 3.	*Campbell, Sir G., K. C. S. I.	Europe
1873 Mar. 5.	†Cappel, A., Esq.	Simla
1876 Aug. 2.	†Carnegy, T. P., Esq.	Assam
1860 Jan. 3.	†Carnac, J. H. Rivett, Esq., B. C. S.	Ghazipur
1876 Nov. 15.	Cayley, H. Dr.	Calcutta
1875 April 4.	Chambers, Dr. E. W.	Calcutta
1868 Aug. 5.	†Chandramohan Gosvámi, Pandit.	Gauhattí
1872 Dec. 4.	†Chard, Rev. C. H.	Thayetmyo
1874 Aug. 5.	†Chennell, A. W., Esq., Topl. Survey.	Shillong
1875 June 2.	†Chennell, T., Esq.	Díbrúghar
1871 Sept. 6.	†Chisholm, R. F., Esq.	Bombay
1868 Feb. 5.	†Clark, Lieut.-Col. E. G., Bengal Staff Corps.	Kheri, Oudh
1872 Aug. 7.	*Clutterbuck, Capt. F. St. Quintin.	Europe
1874 Nov. 4.	†Constable, A., Esq.	Lucknow
1876 Mar. 1.	Crawfurd, J., Esq., c. s.	Calcutta
1868 Dec. 2.	†Cooke, J. E., Esq.	Madras
1876 April 5.	†Coxhead, T. E., Esq.	Tiperah
1874 March 4.	†Crombie, A., Esq., M. D.	Rangoon
1873 Aug. 6.	Cunningham, D. D., Esq., M. B.	Calcutta
1874 July 1.	†Cowan, Capt. S. H., B. S. C.	Arrah
1847 June 2.	*Dalton, Col. E. T., c. s. I., Staff Corps.	Europe
1870 May 4.	†Damant, G. H., Esq., c. s.	Cachar

Date of Election.			
1873 Dec.	3.	†Dames, M. L., Esq., c. s.	DeraGhaziKhan
1871 Jan.	4.	Daukes, F. C., Esq., c. s.	Calcutta
1861 Nov.	6.	†Davies, The Hon'ble R. H., c. s. I., B. C. S.	Lahore
1869 April	7.	*Day, Dr. F., F. L. S., F. Z. S.	Europe
1856 June	4.	†DeBourbel, Major R., Royal Engrs.	Lucknow
1874 July	1.	Deane, Capt. T.	Calcutta
1870 Feb.	2.	†DeFabeck, F. W. A., Esq., I. M. Service.	Deoli
1872 Aug.	7.	Dejoux, P., Esq.	Calcutta
1869 Oct.	6.	†Delmerick, J. G., Esq.	Delhi
1873 Jan.	8.	†Dennys, H. L., Esq.	Sambalpur
1864 July	6.	Devendra Mallik, Bábu.	Calcutta
1862 May	7.	†Dhanapati Singh Dughar, Rái Bahádur.	Azimganj
1853 Sept.	7.	Dickens, Col. C. H., R. A., C. S. I.	Calcutta
1870 May	4.	†Dobson, G. E., Esq., B. A., M. B., F. L. S.	Europe
1875 March	3.	Dodgson, Walter, Esq.	Calcutta
1859 Sept.	7.	†Douglas, Col. C., R. A.	Lucknow
1875 March	3.	Douglas, J., Esq., Govt. Telg. Dept.	Calcutta
1874 July	1.	Drummond, Col. H., R. E.	Calcutta
1867 June	5.	†Duthoit, W., Esq., c. s.	Mirzapur
1871 March	1.	Dvijendranath Thakur, Bábu.	Calcutta
1870 March	8.	†Edinburgh, H. R. H. The Duke of.	Europe
1863 May	6.	†Edgar, J. W., Esq., c. s. I., B. C. S.	Darjiling
1874 Dec.	2.	†Egerton, The Hon. R. E., c. s., c. s. I.	Lahore
1871 Dec.	2.	Elliot, J., Esq., M. A.	Calcutta
1846 Jan.	7.	*Elliot, Sir Walter, late M. C. S.	Europe
1859 Nov.	2.	*Elliot, C. A., Esq., B. C. S.	Europe
1871 Oct.	4.	†Evezard, Col. G. E.	Púna
1863 Oct.	7.	*Ewart, J., Esq., M. D.	Europe
1859 Dec.	7.	Fath Ali, Maulawí,	Calcutta
1851 May	7.	*Fayrer, Sir J., K. C. S. I.	Europe
1863 Jan.	15.	†Fedden, Francis, Esq., Geol. Survey.	Karachi
1876 Jan.	5.	Feistmantel, O., Esq. M. D., Geol. Survey.	Calcutta
1876 July	5.	†Foulkes, The Rev. Thos.	Bangalore
1868 May	6.	†Field, C. D., Esq., M. A., C. S.	Burdwan
1869 Sept.	1.	†Fisher, J. H., Esq., c. s.	Chindwara
1872 Dec.	4.	*Forbes, Major J. G., R. E.	Arrah
1875 Jan.	6.	†Forbes, Capt. C. J. F. S., Depy. Comr.	Shwegyeen, B.
1861 Feb.	6.	†Forest, R., Esq., c. E.	Dehra [Burmah
1869 Oct.	12.	*Forlong, Lieut.-Col. J. G. R., M. S. C.	Europe
1863 June	3.	*Forsyth, Sir T. D., K. C. S. I., C. B.	Europe
1871 Nov.	1.	†Foster, J. M., Esq., M. B. C. P.	Nazira, Assam
1873 July	2.	†Fraser, Capt. E.	Bushire
1869 Sept.	1.	*Fryer, Major G. E.	Europe
1867 Sept.	4.	Fyfe, The Rev. W. C.	Calcutta
1873 Dec.	3.	†Gamble, J. S., Esq.	Pankabari, Dar- jiling

Date of Election.		
1871 Aug.	2.	+Gangaprasad, Munshi.
1874 July	1.	+Gardner, D. M., Esq.
1859 Aug.	3.	†Gastrell, Col. J. E.
1862 Feb.	5.	+Gaurdás Baisák, Bábu.
1867 Sept.	4.	+Gauvain, Capt. V.
1867 Dec.	4.	*Gay, E. Esq., M. A.
1859 Sept.	7.	*Geoghegan, J. Esq., B. C. S.
1875 July	7.	+Girdlestone, C. E. R., Esq., C. S.
1869 Feb.	3.	+Giriprasád Singh, Thákur.
1861 Feb.	6.	Godwin-Austen, Major H. H., F. Z. S., F. R. G. S., Topographical Survey.
1872 Nov.	6.	Gordon, C. B. P., Esq.
1862 July	2.	+Gordon, Robert, Esq., C. E.
1869 July	7.	+Gordon, J. D., Esq., C. S. I., C. S.
1875 July	7.	+Gouldsbury, J. R. E., Esq.
1863 Nov.	4.	+Gowan, Lieut.-Col. J. Y.
1866 June	6.	Gribble, T. W., Esq., B. C. S.
1876 Nov.	15.	Grierson, G. A., Esq., C. S.
1861 Sept.	4.	+Griffin, L. H., Esq., B. C. S.
1873 Aug.	6.	Girischandra Sinha, Rajah.
1861 Feb.	6.	+Growse, F. S., Esq., M. A., B. C. S.
1871 Jan.	4.	Gunendranath Thákur, Bábu.
Jan.	6.	*Gunn, J. S., Esq., M. B., Surg., Bengal Army.
1864 Dec.	5.	+Gurucharan Dás, Bábu.
1871 June	7.	Habiburrahmán, Maulavi.
1867 July	3.	+Hacket, C. A., Esq., Geol. Survey.
1869 April	3.	*Hæberlin, The Rev. C.
1861 March	1.	+Harachandra Chaudhuri, Bábu.
1861 Feb.	2.	+Harrison, A. S., Esq., B. A.
1859 Oct.	6.	*Haughton, Col. J. C., C. S. I.
1874 Jan.	7.	Heintze, C., Esq.
1875 March	3.	+Hendley, Dr. T. H.
1875 Aug.	4.	+Hewitt, J. F. H., Esq., C. S.
1868 Aug.	5.	+Hobart, R. T., Esq., C. S.
1872 Dec.	4.	*Hoernle, Rev. A. F., PH. D.
1868 Nov.	4.	+Holroyd, Major W. R. M.
1873 Jan.	8.	†Houstoun, G. L., Esq., F. G. S.
1863 Jan.	15.	+Howell, M. S., Esq., C. S.
1866 Feb.	7.	Hoyle, G. W., Esq.
1867 Aug.	7.	+Hughes, T. H., Esq., A. E. S. M., F. G. S.
1873 March	5.	+Hughes, A. J., Esq., C. E.
1866 Jan.	17.	+Hughes, Captain W. G., M. S. C.
1870 Jan.	5.	+Hume, Allan O., Esq., C. B., C. S.
1870 June	1.	*Hunter, W. W., Esq., LL. D., C. S.
1868 April	1.	*Hyde, Col. H., R. E.
1872 Dec.	4.	+Ibbetson, D. C. J., Esq., C. S.
		Moradabad
		Azamgarh
		Europe
		Birbhum
		Europe
		Europe
		Nepal
		Allighar
		Calcutta
		Calcutta
		Henzada
		Bangalore
		Montgomery
		Europe
		Calcutta
		Rangpur [jab
		Kapúrthala, Pan-
		Calcutta
		Mathurá
		Calcutta
		Europe
		Krishnagar
		Calcutta
		Geol. S. Office
		Europe [singh
		Sherpur, Maiman-
		Allahabad
		Europe
		Calcutta [ná
		Jaipur, Rájputá-
		Motíhari
		Allahabad
		Europe
		Lahore
		Europe
		Bulandshahr
		Calcutta
		Geol. S. Office
		Barrackpur
		Arracan
		Rajputana
		Europe
		Europe
		Karnál, Panjáb



Date of Election.		
1866 March 7.	†Irvine, W., Esq., c. s.	Fatehgarh.
1871 March 8.	Isaac, T. S., Esq., c. E.	Calcutta
1853 Dec. 7.	†Isvariprasád Singh Bahádur, Raja.	Benares
1874 Feb. 4.	†Jackson, Dr. C. J.	Muzaffarpur
1876 July 5.	Jarrad, Lieut. F. W., R. N.	Calcutta
*1865 June 7.	†Jaykissen Dás Bahádur, Rájá, c. s. I.	Cawnpore
1873 Aug. 6.	Jogeshachandra Datta, Bábu.	Calcutta
1866 Feb. 7.	†Johnson, W. H., Esq.	Patna
1862 March 5.	*Johnstone, Major J. W. H.	Europe
1867 Dec. 4.	*Johnstone, Lt. Col. J.	Almora
1873 Dec. 3.	†Johore, H. H., Maharaja of, K. C. S. I.,	New Johore,
		Singapore
1873 April 2.	*Jones, F., Esq., c. s.	Europe
1875 Nov. 3.	†Jones, S. S., Esq., B. A., C. S.	Sasseram
1869 April 7.	Kabiruddín Ahmad, Maulawí.	Calcutta
1871 May 3.	Káliprasanna Ghosh, Bábu.	Calcutta
1861 Dec. 4.	†Kempson, M., Esq., M. A.	Allahabad
1875 April 7.	†Kerr, Ralph, Major, Lord.	Mathura
1874 Dec. 2.	†Khudábakhsh Khán, Maulawí.	Patna
1867 Dec. 4.	King, G., Esq., M. B.	Calcutta
1867 March 6.	†King, Capt. H. W.	P. & O Co.'s Office
1862 Jan. 15.	King, W., Jr., Esq., Geol. Survey of India.	Geol. Surv. Office
1875 Dec. 1.	Knight, J. B., Esq.	Calcutta
1876 April 5.	Kantichandra Sing, Kumara.	Calcutta
1860 May 5.	Kurz, S., Esq.	Calcutta
1859 Dec. 7.	*Leonard, H., Esq., M. A., C. E.	Europe
1870 July 6.	†Lethbridge, E., Esq., M. A.	Krishnagar
1869 June 2.	*Leupolt, J. C., Esq., c. s.	Europe
1873 Feb. 5.	Lewis, T. R., Esq., M. B.	Calcutta
1864 Nov. 2.	Locke, H. H., Esq.	Calcutta
1866 Jan. 17.	†Low, J., Esq., G. T. Survey.	B. Burmah
1869 July 7.	Lyll, C. J., Esq., B. A., c. s.	Calcutta
1876 May 4.	Lyll, John M., Esq.	Calcutta
1875 Jan. 6.	Lydekker, R., Esq., Geol. Survey of India.	Calcutta
1870 April 6.	†Lyman, B. Smith, Esq.	Japan
1866 June 6.	Macdonald, Lieut.-Col. J., B. s. c.	Calcutta
1876 Dec. 6.	†Macdonald, J. C., Esq.	N. W. P. Terai
1873 May 7.	*Mackay, W., Esq., c. E.	Europe
1873 Dec. 3.	McLeod, K., Esq., M. D.	Europe
1848 April 5.	†Maclagan, Major-General R., R. E., F. R. S. E., F. R. G. S.	Lahore
1867 July 3.	*Macnamara, Dr. C.	Europe
1868 Dec. 2.	†Macauliffe, M., Esq., c. s.	Jhelum
1874 Jan. 7.	†Magrath, C. F., Esq., c. s.	Bogra

Date of Election.			
1867 April	3.	Mahendralál Sirkár, Dr.	Calcutta
1867 April	3.	Mainwaring, Lieut.-Col. G. B.	Calcutta
1876 Dec.	6.	Malleson, Col. G. B., C. S. I.	Calcutta
1852 Nov.	3.	Manickjee Rustamjee, Esq.	Calcutta
1872 Nov.	6.	†Man, E. H., Esq.	Port Blair
1869 July	7.	†Markham, A. M., Esq., C. S.	Allahabad
1874 Aug.	5.	*Marsh, Capt. H. C.	Europe
1873 July	2.	†Marshall, C. W., Esq.	Berhampur
1873 Aug.	6.	†Marshall, Lieut.-Col. W. E.	Simla
1875 April	4.	McConnell, Dr. J. F. P., Prof. Med. Coll.	Calcutta
1876 Jan.	5.	†McGregor, W., Esq., Supt. I. Telegraph.	Akyab
1860 March	7.	†Medlicott, H. B., Esq., M. A., F. G. S. Supt. Geol. Survey.	Calcutta
1871 Sept.	6.	†Miles, Major S. B.	Muskat
1870 July	6.	*Miller, A. B., Esq.	Europe
1874 May	6.	†Minchin, F. J. V., Esq.	Aska, Ganjam
1875 Aug.	4.	†Minchin, Lieut.-Col. C. C.	Bahawalpur
1876 Dec.	6.	†Mockler, Capt. E., Pol. Agent.	Gwadur
1874 July	1.	†Molesworth, W. G., Esq., C. E.	Simla
1867 March	6.	*Montgomerie, Major T. G., R. E.	Europe
1854 Dec.	6.	Morris, The Hon'ble G. G., B. C. S.	Calcutta
1854 Oct.	11.	*Muir, Sir W., K. C. S. I., B. C. S.	Europe
1862 July	2.	*Napier of Magdala, Baron, General, G. C. S. I., G. C. B.	Europe
1876 May	4.	Nash, A. M., Esq.	Calcutta
1865 Feb.	1.	Nevill, G., Esq., C. M. Z. S.	Calcutta
1871 Jan.	4.	*Newton, Isaac, Esq.	Europe
1872 May	1.	†Niranjan Mukerji, Bábu.	Benaras
1869 July	7.	†Nursing Rao, A. V., Esq.	Vizagapatam
1871 July	5.	†Oates, E. W., Esq., C. E.	Pegu
1874 Oct.	4.	O'Kinealy, J., Esq., C. S.	Calcutta
1851 June	4.	*Oldham, T., Esq., LL. D., F. R. S.	Europe
1873 Aug.	6.	Olpherts, W. J., Esq.	Calcutta
1864 March	2.	Palmer, Dr. W. J.	Calcutta
1873 Aug.	6.	Parker, J. C., Esq.	Calcutta
1876 June	7.	Parry, R., Esq.	Calcutta
1862 May	7.	†Partridge, S. B., Esq., M. D.	Europe
1871 Dec.	6.	†Peal, S. E., Esq.	Sibsagar, Assam
1867 March	6.	†Pearimohan Mukerji, Bábu, M. A.	Uttarpara
1860 Feb.	1.	*Pearse, Lieut.-Col. G. G.	Europe
1868 Nov.	4.	†Pearson, C. E., Esq., M. A.	Rawul Pindee
1873 Aug.	6.	Pedler, A., Esq.	Calcutta
1869 July	7.	Pell, S., Esq.	Calcutta
1864 March	2.	†Pellew, F. H., Esq., C. S.	Hooghly
1865 Sept.	6.	†Peppé, T. E., Esq.	Ranchi

Date of Election.			
1868 May	6.	Peterson, F. W., Esq.	Calcutta
1835 July	1.	†Phayre, Major-Gen., Sir A. P., K. C. S. I., C. B.	Mauritius
1864 Nov.	2.	*Phear, The Hon'ble J. B.	Europe
1869 Feb.	3.	†Pickford, J., Esq., M. A.	Madras
1875 Feb.	3.	†Porter, W. J., Esq.	Shwegyeen, B. Burmah
1868 April	1.	†Pramathanáth Ráy, Raja.	Digapati
1872 Dec.	4.	Prannáth Sarasvati Pandit, M. A., B. L.	Bhawanipur
1869 Feb.	3.	Pratápachandra Ghosha, Bábu, B. A.	Calcutta
1874 Dec.	2.	†Protheroe, Capt. M.	Port Blair
1856 Mar.	5.	Rájendralála Mitra, Bábu, Raí Bahádúr LL.D.	Calcutta
1871 June	7.	Rámakrishna Dás, Bábu.	Calcutta
1837 Feb.	1.	Rámanáth Tagor, The Hon. Mahárájá, C. S. I.	Calcutta
1874 Dec.	2.	†Rám Dás Sen, Bábu.	Berhampur
1876 July	5.	Raye, D. O'Connell, Esq., M. D.	Calcutta
1860 Mar.	7.	†Reid, H. S., Esq., C. S.	Allahabad
1871 July	5.	†Reid, J. R., Esq., C. S.	Azinghar
1872 April	3.	†Richards, Dr. V.	Goalundo
1868 April	1.	Robb, G., Esq.	Calcutta
1863 April	1.	†Robertson, C., Esq., C. S.	Mirzapur
1874 May	6.	*Robinson, Col. D. G., R. E.	Europe
1865 Feb.	1.	Robinson, S. H., Esq.	Calcutta
1876 Dec.	6.	†Rodon, Lieut. G. S., Royal Scots.	Ranikhet
1870 Jan.	5.	*Ross, Alexander G., Capt., Staff Corps.	Europe
1871 Dec.	6.	*Samuells, Capt. W. L., B. S. C.	Europe
1872 Feb.	7.	†Sashagiri Sastri, M., B. A.	Madras
1870 May	4.	Satyánand Ghoshál, Rájá.	Calcutta
1873 Jan.	8.	Schlegel, F., Esq.	Calcutta
1870 May	4.	†Schlich, Dr. W.	Darjiling
1869 Feb.	3.	*Schwendler, L., Esq.	Europe
1876 July	5.	†Scott, D., Esq., C. E.	Cuttak
1876 July	5.	†Scott, R., Esq., C. S.	Muzaffarnagur
1874 July	1.	†Scully, Dr. J.	Nepal [mir
1876 Feb.	2.	†Shaw, R. B., Esq.	(Ladak) Kash-
1860 July	4.	†Shelverton, G., Esq.	Waltair, near Vizagapatam
1863 April	1.	†Showers, Lieut.-Col. C. L.	Amballa
1872 Aug.	7.	†Skrefsrud, Rev. L. O.	Santhal Mission Rampur Haut
1864 Sept.	7.	†Sladen, Lieut.-Col. E. B.	Arracan
1875 Feb.	3.	*Smidt, J., Esq.	Europe
1865 July	5.	Smith, D. Boyes, Esq., M. D.	Calcutta
1874 June	3.	†Smith, V. A., Esq., C. S.	Hamirpur
1864 Mar.	2.	†Spearman, Capt. H. R.	Amherst

Date of Election.			
1872 July	3.	+Stephen, Carr, Esq.	Ludianah
1863 Sept.	2.	+Stewart, R. D., Esq.	Raniganj
1875 July	7.	*Stewart, M. G., Esq.	Europe
1876 Aug.	2.	+St. John, Major O. B., R. E.	Ajmir, Mayo College
1861 Sept.	4.	Stokes, Whitley, Esq., C. S. I.	Calcutta
1869 Feb.	3.	Strachey, The Hon'ble Sir J., K. C. S. I.	Calcutta
1859 Mar.	2.	Stubbs, Lieut.-Col. F. W., Royal Artillery.	Ishapur near Barrackpur
1858 July	7.	+Sutherland, H. C., Esq., B. C. S.	Backergunge
1864 Aug.	11.	Swinhoe, W., Esq.	Calcutta
1865 Sept.	6.	*Tawney, C. H., Esq., M. A.	Europe
1865 April	5.	Taylor, R., Esq., C. S.	Calcutta
1874 Mar.	4.	Taylor, Commander A. D., late Indian Navy.	Calcutta
1860 May	2.	+Temple, The Hon. Sir R., Bart., K. C. S. I., B. C. S.	Bombay
1876 Feb.	2.	Tennant, Col. J. F., R. E., F. R. S.	Calcutta
1875 June	2.	+Thibaut, Dr. G.	Benares
1869 Oct.	6.	+Thomson, A., Esq.	Faizabad
1875 Nov.	3.	+Thomson, R. G., Esq., C. S.	Sirsa
1847 June	2.	Thuillier, Col. H. L., R. A., C. S. I., F. R. S.	Calcutta
1865 July	5.	*Tolbort, T. W. H., Esq., C. S.	Europe
1871 April	5.	*Trefftz, Oscar, Esq.	Europe
1861 June	5.	+Tremlett, J. D., Esq., M. A., C. S.	Muzaffargarh
1872 July	3.	+Trevor, W. S., Lieut.-Col., R. E.	Indor
1873 April	2.	Turnbull, R., Esq.	Calcutta
1863 May	6.	+Tyler, J. W., Esq., M. D.	Agra
1869 June	2.	+Udaychand Dutt, Bábu.	Faridpur
1873 April	2.	Umesh Chunder Dutt, Bábu.	Calcutta
1860 May	2.	*Vanrenen, Lieut. Col. A. D., B. C. S.	Calcutta
1864 Feb.	3.	+Verchère, A. M., Esq., M. D.	Agra
1864 April	6.	+Vijayaráma Gujapati Raj Munniá Sultán Bahádur, Maharájah Mirza Vijayagram.	Benares
1870 June	1.	+Vrindávanachandra Mandala, Bábu.	Balisor
1871 Feb.	1.	*Waagep, Dr. W., Geological Survey.	Europe
1869 Aug.	4.	Wáhid Ak, Prince Jahán Mádh Bahádur.	Garden Reach
1865 Nov.	1.	Waldie, D., Esq., F. G. S.	Calcutta
1861 May	1.	*Walker, Col. J. T., R. E., F. R. S.	Europe
1875 April	7.	Wall, Dr. A. J., B. Medical Service.	Calcutta
1863 Oct.	7.	Waller, W. K., Esq., M. B.	Calcutta
1865 May	3.	Waterhouse, Capt. J., B. S. C.	Calcutta

Date of Election.		
1874 July	1.	Watt, Dr. George.
1876 Dec.	6.	Webb, W. T., Esq., M. A.
1869 Sept.	1.	*Westland, J., Esq., C. S.
1867 Feb.	6.	†Westmacott, E. V., Esq., B. A., C. S.
1862 Oct.	8.	Wheeler, J. T., Esq.
1873 April	2.	†White, E., Esq., C. S.
1875 Feb.	3.	†Whiteway, R. S., Esq., C. S.
1867 Aug.	7.	†Wilcox, F., Esq.
1873 May	7.	†Williams, G. R. C., Esq., C. S.
1867 Jan.	16.	†Williamson, Capt. W. J.
1876 April	5.	Wilson, Alexander, Esq.
1870 Aug.	3.	Wilson, R. H., Esq., C. S.
1866 Mar.	7.	*Wise, Dr. J. F. N.
1867 July	3.	†Wood, Dr. J. J.
1874 Mar.	4.	Wood, C. H., Esq.
1870 Jan.	5.	Wood-Mason, J., Esq., Indian Museum.
1873 Aug.	6.	†Woodthorpe, Lieut. R. G., R. E.
1869 Sept.	1.	Yadulál Mallik, Bábu.
1868 June	3.	Yatindramohana Tagore, The Hon'ble Maharaja.
1867 Mar.	6.	†Yogendranáth Mallik, Bábu.
HONORARY MEMBERS.		
1825 Mar.	9.	M. Garcin de Tassy, Memb. de l'Institut.
1821 "	6.	Sir John Phillippart.
1826 July	1.	Count de Noe.
1835 May	6.	Professor Isaac Lea.
1847 Sept.	1.	Col. W. Munro.
1847 Nov.	3.	His Highness the Nawab Nazim of Bengal.
1848 Feb.	2.	Dr. J. D. Hooker.
1848 Mar.	8.	Professor Henry.
1853 April	6.	Major-Gen. Sir H. C. Rawlinson, K. C. B.
1858 July	6.	B. H. Hodgson.
1859 Mar.	2.	The Hon'ble Sir J. W. Colville, Kt.
1860 "	7.	Professor Max Müller.
1860 Nov.	7.	Monsieur Stanislas Julien.
1860 "	7.	Edward Thomas.
1860 "	7.	Dr. Aloys Sprenger.
1860 "	7.	Dr. Albrecht Weber.
1868 Feb.	5.	General A. Cunningham, C. S. I.
1868 "	5.	Professor Bápu Déva Sástri.
1868 "	5.	Dr. T. Thomson.
1868 "	2.	A. Grote.
1871 "	7.	Charles Darwin.
		Hughli
		Calcutta
		Europe
		Dinajpur
		Calcutta
		Bijnour
		Muttra
		Purulia
		Banda
		Garo Hills
		Calcutta
		Calcutta
		Europe
		Ránchi
		Calcutta
		Calcutta
		Nága Hills
		Calcutta
		Calcutta
		Andul
		Paris
		London
		Paris
		Philadelphia
		London
		Murshidabad
		Kew
		Princeton, U. S.
		London
		Europe
		Europe
		Oxford
		Paris
		London
		Bern
		Berlin
		India
		Benares
		London
		London
		London

Date of Election.			
1872 Feb.	1.	Sir G. B. Airy.	London
1872 June	5.	Professor T. H. Huxley.	London
1875 Nov.	3.	Dr. O. Böhtlingk.	Jena
1875 „	3.	Professor J. O. Westwood.	Oxford
1876 April	5.	Yule, Col. H., R. E., C. B.	London
1876 „	5.	Siemens, Dr. Werner.	Berlin

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CORRESPONDING MEMBERS.

1844 Oct.	2.	Macgowan, Dr. J.	Europe
1856 June	4.	Krämer, Herr A. von.	Alexandria
1856 „	3.	Porter, Rev. J.	Damascus
1856 „	4.	Schlagintweit, Herr H. von.	Munich
1856 „	4.	Smith, Dr. E.	Beyrout
1859 „	4.	Taylor, J., Esq.	Bussorah
1857 Mar.	4.	Nietner, J. Esq.	Ceylon
1858 „	3.	Schlagintweit, Herr R. von.	Giessen
1859 Nov.	2.	Frederick, Dr. H.	Batavia
1859 May	4.	Bleeker, Dr. H.	Europe
1860 Feb.	1.	Baker, The Rev. H.	E. Malabar
1860 „	1.	Swinhoe, R., Esq., H. M.'s Consul.	Amoy
1861 July	3.	Gösche, Dr. R.	
1862 Mar.	5.	Murray, A., Esq.	London
1863 July	4.	Barnes, R. H., Esq.	Ceylon
1866 May	7.	Schlagintweit, Prof. E. von.	Munich
1866 „	7.	Sherring, Rev. M. A.	Benares
1868 „	5.	Holmböe, Prof.	Christiania

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ASSOCIATE MEMBERS.

1865 May	3.	Dall, Rev. C. H.	Calcutta
1874 Feb.	4.	Schomburgk, J., Esq.	Calcutta
1874 April	1.	Latouche, R. v. F. E., s. j.	Calcutta
1875 Dec.	1.	Bate, Rev. J. D.	Allahabad
1875 „	1.	Maulawí Abdul Hai, Madrasah.	Calcutta

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LIST OF MEMBERS WHO HAVE BEEN ABSENT FROM INDIA  
THREE YEARS AND UPWARDS.\*

\**Rule 40.*—After the lapse of 3 years from the date of a Member leaving India, if no intimation of his wishes, shall, in the interval have been received by the Society his name shall be removed from the list of Members.

The following Members will be removed from the Member List of the Society under the operation of the above Rule.

Date of leaving India.

Clutterbuck, Capt. F. St. Quintin,.....	January 1873.
Gauvain, Capt. V., .....	July 1873.
Haeberlin, the Rev. C., .....	August 1873.
Pearson, C. E., Esq., M. A., .....	January 1874.

LOSS OF MEMBERS DURING 1876.

BY RETIREMENT.

C. Macnaghten, Esq.	Rajkot College.
W. Bourne, Esq.	Calcutta.
G. E. Knox, Esq.	Banda.
Major H. H. Mallock.	Calcutta.
Lieut. H. B. Urmston.	Panjab.
W. Theobald, Esq.	Calcutta.
H. C. Williams, Esq.	Chanda.
A. Tween, Esq.	Calcutta.
R. Stewart, Esq.	Calcutta.
T. B. Mitchell, Esq.	Assam.
Raja Harendra Krishna Bahadur.	Calcutta.
J. Wilson, Esq.	Bankipur.
C. T. Buckland, Esq.	Calcutta.
Capt. E. N. D. La Touche.	Assam.
Capt. C. S. Pratt.	Europe.
J. Hector, Esq.	Calcutta.
R. A. Carrington, Esq.	Calcutta.

BY DEATH.

*Ordinary Members.*

Butler, Capt. J., B. S. C.	Samaguting.
Willson, W. G., Esq.	Calcutta.
Atkinson, W. S., Esq., M. A.	Europe.
Heeley, W. L., Esq., B. A., C. S.	Europe.
Brown, R., Esq., M. D.	Manipur.
Milman, R., D. D., the Right Rev., Lord Bishop of Calcutta.	Calcutta.

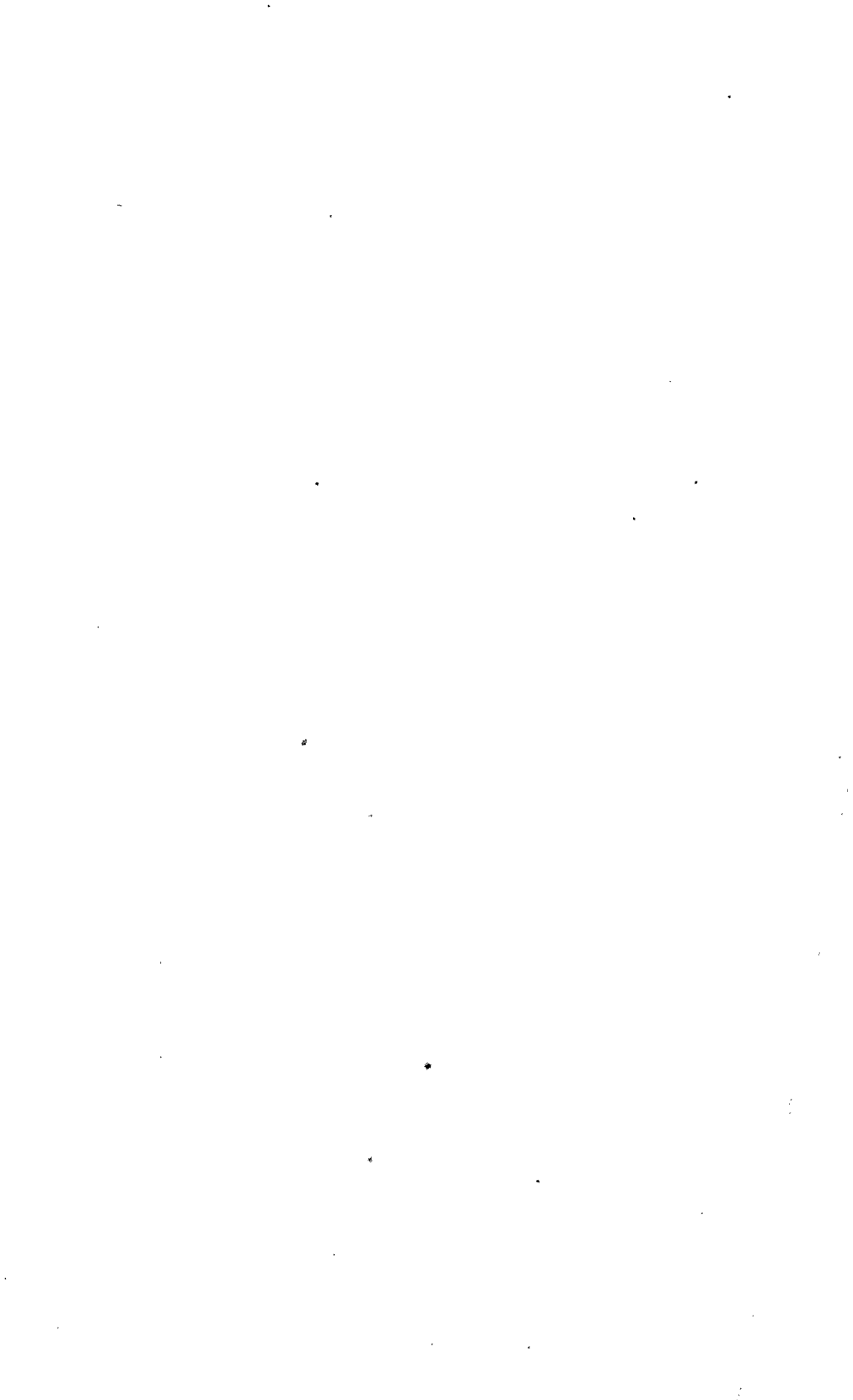
*Honorary Members.*

Prof. C. Lassen.	Bonn.
Prof. Jules Mohl.	Paris.
Dr. Robert Wight, ( <i>died in 1873.</i> )	London.

*Corresponding Members.*

Haug, Dr. M.	Munich.
Foucaux, M. F. H.	Paris.





[APPENDIX.]

ABSTRACT STATEMENT  
OF  
RECEIPTS AND DISBURSEMENTS  
OF THE  
ASIATIC SOCIETY OF BENGAL  
FOR  
THE YEAR 1876.

# STATEMENT, *Abstract of the Cash Account*

RECEIPTS.				1876.	1875.					
BALANCE OF 1875.										
In the Bank of Bengal, viz.										
Account of Stoliczka Memorial Fund, ..	Rs.	812	5	2						
Account of Asiatic Society of Bengal, ..	..	3,045	13	1						
				3,858	2	3				
Cash in hand, ..	..			160	9	4				
					4,018	11	7			
ADMISSION FEES.										
Received from Members, ..	..	800	0	0						
				800	0	0	930	0	0	
SUBSCRIPTIONS.										
Received from Members, ..	..	9,009	1	9						
				9,009	1	9	9,760	15	0	
PUBLICATIONS.										
Sale proceeds of Journal and Proceedings, ..	..	409	0	0						
Subscription to ditto, ..	..	1,056	0	0						
Refund of Postage Stamps, ..	..	15	14	6						
Ditto of Printing charges, ..	..	54	9	6						
					1,535	8	0	1,729	10	0
LIBRARY.										
Sale proceeds of Books, ..	..	280	3	0						
Refund of Freight, ..	..	23	12	0						
Ditto of Postage ..	..	8	10	6						
					312	9	6	411	14	0
SECRETARY'S OFFICE.										
Saving of Salary, ..	..	36	5	3						
Received fine, &c., ..	..	2	8	3						
Ditto Commission on Purchase of Stamps, ..	..	6	9	9						
Sale proceeds of two Wooden Casks, ..	..	1	11	0						
Refund of Cart and Cooley hire, ..	..	13	6	0						
					60	8	3	24	15	6
VESTED FUND.										
Received from the Secretary of State for India on account of abandonment by the Society of all claims to accommodation in the New Museum building, ..										
	..	1,50,000	0	0						
Interest on the Government Securities from the Bank of Bengal, ..	..	8,573	0	0						
Sale proceeds of 5½ per cent. Government Securities Nos. 043894, 043518, 189, 60, ..	..	5,000	0	0						
Carried over Rs.				1,63,573	0	0	15,736	7	1	

No. 1.

### DISBURSEMENTS.

	1876.	1875.
Paid Freight for sending Journal and Proceedings, .. .. .	168 9 0	
Ditto Lithographing and Engraving .. .. .	1,605 11 0	
" " Charges, .. .. .	5,381 9 6	
" " on Collecting Bills, .. .. .	3 4 3	
Ditto Purchase of Postage Stamps, .. .. .	281 0 0	
Ditto Packing charges, .. .. .	24 11 0	
Ditto Paper for Plates, .. .. .	153 6 0	
Ditto Journal Binding, .. .. .	6 0 0	
Ditto Printing charges for a Catalogue of Mammals and Birds of Burmah for Journal Part II, No. 1 of 1875 (£ 62-4-6 @ 1s. 9½ per rupee), .. .. .	711 2 3	
Ditto overland carriage on parcels of lithographed Plates, from England, .. .. .	42 2 0	
Ditto Major H. H. Godwin-Austen for printing and coloring Plates of Naga Hill Views, Daffa Shells, &c., .. .. .	499 9 0	
Ditto Petty charges, .. .. .	16 14 6	
	<hr/>	
		8,893 14 6 7,373 2 1
 LIBRARY.		
Paid Salary of Librarian, .. .. .	1,800 0 0	
Ditto Establishment, .. .. .	136 0 0	
Ditto Commission on Collecting Bills, .. .. .	0 1 3	
Ditto Landing charges, .. .. .	10 3 3	
Ditto Book Binding, .. .. .	408 2 0	
Ditto Salary of Punkha Bearer, .. .. .	38 5 3	
Ditto Subscription to the Calcutta Review, .. .. .	16 0 0	
Ditto ditto to the Medical Gazette, .. .. .	15 0 0	
Ditto ditto to Stray Feathers, .. .. .	11 0 0	
Ditto Purchase of Books through Messrs. Trübner & Co., .. .. .	177 9 6	
Ditto ditto of ditto through Messrs. ... .. .	172 14 6	
Ditto ditto of ditto in Calcutta, .. .. .	306 9 2	
	<hr/>	
	657 1 2	
Ditto repairing glass cases, .. .. .	23 0 0	
Ditto Freight, .. .. .	5 1 5	
Ditto Postage, .. .. .	3 1 0	
Ditto ... .. .	12 0 0	
Ditto Petty charges, .. .. .	26 8 3	
	<hr/>	
		3,161 7 7 4,475 6 6
 SECRETARY'S OFFICE.		
Paid General Establishment, .. .. .	397 8 0	
Ditto Secretary's Establishment, .. .. .	1,658 0 0	
Ditto Purchase of Postage Stamps, .. .. .	124 0 0	
	<hr/>	
Carried over, Rs.	2,179 8 0	12,055 6 1

RECEIPTS.			1876.	1875.
Brought over, Rs. 1,63,573 0 0			15,736 7 1	
Interest on ditto from 30th November to 12th December, 1876, being 12 days @ $5\frac{1}{2}$ per cent., ..	9 2 8			
Premium on ditto @ 1-14 per cent., ..	93 12 0			
	<u>102 14 8</u>		1,63,675 14 8	449 0 0
<b>BUILDING.</b>				
Received from the Right Hon'ble the Secretary of State for India from 1st December, 1875 to 21st April, 1876, @ Rs. 400 per month, ..	1,920 0 0		1,920 0 0	4,800 0 0
<b>DR. STOLICZKA MEMORIAL FUND.</b>				
Received Subscription to the Fund, ..	181 0 0		181 0 0	1,350 0 0
<b>PIDDINGTON FUND.</b>				
Refund by the Committee of the Chamber of Commerce of the moiety of Subscriptions to the Fund, from the Asiatic Society (Rs. 1,172), ..	586 4 0		586 4 0	
<b>PIDDINGTON PENSION FUND.</b>				
Received by Transfer from the Piddington Fund, ..	586 4 0			
Deduct Refund to Capt. W. J. A. Wallace, of half his subscription, ..	8 0 0			
	<u>578 4 0</u>			
Subscription Received from W. T. Blanford, Esq., to the Fund, ..	25 0 0			
Ditto Interest on the Government Security of Rs. 500, ..	27 8 0			
	<u>630 12 0</u>			
<b>DR. OLDHAM MEMORIAL FUND.</b>				
Received Subscription to the Fund, ..	156 0 0		156 0 0	
<b>MISCELLANEOUS.</b>				
Fund Account, ..	1,040 7 6			
O. P. Fund, ..	1,086 5 9			
Conservation of Sanscrit MSS., ..	1,000 0 0			
W. Irvine, Esq., ..	10 12 0			
M. S. Howell, Esq., ..	0 9 0			
Capt. W. L. Samuells, ..	5 13 0			
C. W. Marshall, Esq., ..	3 7 0			
The Rev. C. H. Chard, ..	0 6 0			
J. W. Edgar, Esq., ..	4 11 0			
Money Lal Bysack, ..	67 13 0			
Jadubindo Bysack, ..	493 10 6			
T. W. H. Tolbort, Esq., ..	3 6 0			
Messrs. Trübner & Co., ..	4 6 6			
Capt. C. J. F. Forbes, ..	5 0 0			
W. W. Hunter, Esq., ..	1 8 0			
L. Schwendler, Esq., ..	9 7 0			
H. Blochmann, Esq., ..	9 0 0			
G. Nevill, Esq., ..	6 11 9			
Carried over, Rs.	3,753 6 0		1,82,886 5 9	

## DISBURSEMENTS.

1876.

1875.

Brought over, Rs.	2,179	8	0	12,055	6	1
Paid Insufficient and Bearing Postage,		4	14	0		
Ditto Meeting charges, ..	128	11	0			
Ditto Commission on Subscription collected,	54	14	3			
Ditto Salary of Mali, ..	72	0	0			
Ditto Printing charges, ..	198	15	6			
Ditto Pension to Islam Khan, ..	36	0	0			
Ditto Fee to the Bank of Bengal for ..		3	2	0		
Ditto ditto ..	58	1	0			
Ditto Binding Letter files, ..	6	13	0			
Ditto Advertising charges, ..	43	0	0			
Ditto. Subscription to the Calcutta Directory, ..	14	0	0			
Ditto ditto to the Army List, ..	12	0	0			
Ditto Carpenter for opening and fixing glass cases, 24	14	0				
Ditto ditto for repairing Book Shelves, Meeting Table, &c., ..	28	2	0			
		53	0	0		
Ditto to the Collector of Stamps Revenue of Calcutta for Stamping the Memorandum of Association of the Asiatic Society, 16	0	0				
Ditto Registration fee for ditto, ..	50	0	0			
		66	0	0		
Ditto a copy of Indian Postal Guide, ..	1	0	0			
Ditto Petty charges, ..	65	3	3			
Ditto Ticca Cooley for removing Books and Shelves, &c., ..	78	6	0			
				3,075	8	0

## FURNITURE AND FITTINGS.

Paid a Teakwood Table for Duftory, ..	14	0	0			
Ditto three Teakwood Racks, ..	183	0	0			
Ditto a Teakwood large Glass Case, ..	253	0	0			
Ditto Repairing and fixing Cane Matting in four rooms, ..	298	0	0			
Ditto ditto and fixing New ..	1,146	10	0			
		1,444	10	0		
Ditto a dozen of Teakwood rattan-back Arm-chairs, ..	67	4	0			
Ditto a pair six branches Gasolier, ..	400	0	0			
				2,361	14	0

## VESTED FUND.

Paid Purchase of $5\frac{1}{2}$ per cent. Government Security through Bank of Bengal, 1,44,800	0	0				
Ditto Interest on ditto, ..	2,716	10	7			
Ditto Premium on ditto, ..	3,025	10	0			
Ditto Commission on ditto, ..	376	5	6			
Ditto ditto on Collecting Interest on Government Securities, ..	21	6	8			
Ditto ditto on Selling Government Security of Rs. 5,000, ..	12	12	1			
Carried over, Rs. 1,50,952	12	10		17,492	12	1

RECEIPTS.				1876.	1875.
Brought over, Rs.	3,753	6	0	1,82,886	5 9
Dr. G. Thibaut, ..	..	27	6 0		
The Hon'ble C. R. Lindsay, ..	..	0	11 0		
H. W. Dashwood, Esq., ..	..	0	12 0		
Babullah Duffery, ..	..	10	0 0		
Dr. T. H. Hendley, ..	..	19	10 0		
E. V. Westmacott, Esq., ..	..	3	4 0		
S. Kurz, Esq., ..	..	122	0 0		
C. Grant, Esq., ..	..	0	11 0		
M. L. Dames, Esq., ..	..	0	3 0		
Lt.-Col. J. Burn, ..	..	2	10 0		
The Government North-Western Pro-					
vinces, ..	..	13	8 0		
B. Quaritch, Esq., ..	..	128	14 0		
Lt.-Col. Lord R. Kerr, ..	..	2	0 0		
V. A. Smith, Esq., ..	..	2	7 0		
J. Beames, Esq., ..	..	20	0 0		
F. S. Growse, Esq., ..	..	2	0 0		
H. F. Blanford, Esq., ..	..	3	4 9		
A. S. Harrison, Esq., ..	..	3	0 0		
Col. W. E. Marshall, ..	..	1	15 0		
W. Stokes, Esq., ..	..	1	14 0		
J. G. Delmerick, Esq., ..	..	1	0 0		
Col. H. L. Thuillier, ..	..	0	3 0		
Braj Bhushan Das, ..	..	0	0 3		
The Hon'ble Sir E. C. Bayley, K. C. S. I.,		1	8 0		
				4,122	3 0 2,307 0 1

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Carried over, Rs. 1,87,008 8 9

## DISBURSEMENTS.

1876.

1875.

Brought over, Rs.				1,50,962	12	10	17,492	12	1
Paid ditto Brokerage on ditto	..	..	..	6	4	0			
Ditto Fee for renewing Government Securities, ..	..	..	..	3	0	0			
				<hr/>					
				1,50,962	0	10	4,073	9	8
BUILDING.									
Paid House rate, ..	..	..	..	372	0	0			
Ditto Police and Lighting rate, ..	..	..	..	276	0	0			
Ditto Water rate, ..	..	..	..	213	13	6			
Ditto making Drawing of the Asiatic Society's Premises, ..	..	..	..	13	14	0			
Ditto J. B. Norton, Esq., for supplying and fixing Gas Pipes, ..	..	..	..	762	6	0			
Ditto ditto 96 Jets for ditto ditto with Pipe and Cocks complete in the Meeting room, ..	..	..	..	401	6	0			
Ditto Messrs. Mackintosh, Burn & Co., in part payment for repairing the Society's Premises, ..	..	..	..	8,000	0	0			
				<hr/>					
				10,039	7	6	1,008	12	7
COIN FUND.									
Purchase of Silver Coins, ..	..	..	..	39	0	0			
Ditto of two Gold Coins, ..	..	..	..	41	10	0			
Paid Cooley and Cart for bringing a Coin box from the Mint, ..	..	..	..	0	7	0			
Ditto Banghy Expense for sending a packet of Gold Coins to W. Campbell, Esq., Beerbhoom, ..	..	..	..	0	4	0			
Ditto for getting Money Order, ..	..	..	..	0	4	0			
Ditto Insulation Postage on Packet of Gold Coin, ..	..	..	..	0	4	0			
				<hr/>					
				81	13	0	376	4	0
DR. OLDHAM MEMORIAL FUND.									
Paid Printing charges, 370 Copies of Circular, ..	..	..	..	11	0	0			
Ditto Advertising the List of Subscribers to the Fund, ..	..	..	..	14	8	0			
				<hr/>					
				25	8	0			
DR. STOLICZKA MEMORIAL FUND.									
Remitted to A. Grote, Esq., London, 3 overland Money Orders Nos. 143 to 145, dated 10th July 1876, @ £ 10 each, ..	..	..	..	395	3	3			
Ditto ditto 2 Overland Money Orders Nos. 161 and 162, dated 17th July 1876, @ £ 10 each, ..	..	..	..	263	7	6			
				<hr/>					
				658	10	9	1,738	14	4
PIDDINGTON FUND.									
Refunded to Capt. W. J. A. Wallace, being half his Subscription to the above Fund, ..	..	..	..	8	0	0			
Paid by Transfer to the Piddington Pension Fund, ..	..	..	..	578	4	0			
				<hr/>					
				586	4	0			
PIDDINGTON PENSION FUND.									
Paid to the Bank of Bengal for Purchase of 5½ per cent., Government Security No. 047143—021980, of 1859-60, ..	..	..	..	500	0	0			
				<hr/>					
Carried over, Rs.				500	0	0	1,79,846	8	2



RECEIPTS.	1876.	1875.
Brought over, Rs.	1,87,008 8 9	

Carried over, Rs. 1,87,008 8 9

## DISBURSEMENTS.

1876.

1875.

Brought over, Rs.	500	0	0	1,79,846	8	2
Paid Interest on ditto from 30th Nov. 1875 to 7th September, 1876, being 9 months, and 7 days @ $5\frac{1}{2}$ per cent., ..	21	2	6			
Ditto Premium on ditto @ $1\frac{1}{2}$ per cent., ..	22	8	0			
Ditto Commission ditto @ $\frac{1}{2}$ per cent., ..	1	5	9			
Refunded to R. Taylor, Esq., half his Subscription to the Fund, ..	15	0	0			
Paid Commission on Collecting Interest on Government Security, ..	0	0	7			
				560	0	10

## MISCELLANEOUS.

Paid donation towards a Zoological Exploration of Tenasserim, ..	500	0	0			
Fund Account, ..	1,130	0	0			
O. P. Fund, ..	86	5	9			
Earth Current Account, ..	18	0	0			
Lt.-Col. C. C. Minchin, ..	1	0	0			
J. Beames, Esq., ..	1	9	0			
Capt. E. Fraser, ..	0	8	0			
M. Macauliffe, Esq., ..	3	12	0			
J. G. Delmerick, Esq., ..	0	10	0			
F. S. Growse, Esq., ..	3	14	0			
Money Lal Bysack, ..	116	14	6			
Jadubindo Bysack, ..	445	12	0			
The Government North Western Provinces, ..	8	5	0			
Major W. R. M. Holroyd, ..	2	4	0			
L. Schwendler, Esq., ..	9	7	0			
G. Nevill, Esq., ..	6	11	9			
Dr. G. Thibaut, ..	26	2	6			
Dr. F. Keilhorn, ..	1	2	0			
J. W. Edgar, Esq., ..	1	15	0			
Dr. T. H. Hendley, ..	19	10	0			
G. H. Damant, Esq., ..	0	12	0			
Capt. C. J. F. S. Forbes, ..	3	12	9			
L. H. Guffin, Esq., ..	1	7	0			
Lt.-Col. J. Burn, ..	50	10	0			
S. Kurz, Esq., ..	122	0	0			
The Hon'ble C. R. Lindsay, ..	0	11	0			
C. Grant, Esq., ..	0	11	0			
H. W. Dashwood, Esq., ..	0	11	0			
Maulavi Syad Jamadali, ..	0	11	0			
M. Sashagiri Sastri, ..	0	11	0			
H. H. the Rao of Kutch, ..	0	11	0			
V. A. Smith, Esq., ..	1	11	0			
Major H. H. Godwin-Austen, ..	2	12	0			
W. Stokes, Esq., ..	1	14	0			
Babullah Duftery, ..	10	0	0			
W. Irvine, Esq., ..	6	9	6			
W. J. Porter, Esq., ..	0	4	0			
Major-General A. Cunningham, C. S. I., ..	0	8	0			
The Hon'ble Sir E. C. Bayley, C. S. I., ..	1	8	0			
C. J. Lyall, Esq., ..	0	1	0			
W. M. ... ..	2	7	6			
C. I. ... .. Esq., ..	1	9	0			
The Rev. F. Foulkes, ..	1	2	0			
E. Lethbridge, Esq., ..	0	3	0			
Raja Joykissen Doss, ..	0	3	0			

Carried over, Rs. 2,597 6 3 1,80,406 9 0

RECEIPTS.	1876.	1875.
Brought over, Rs.	1,87,008	8 9

Rs. 1,87,008 8 9

Examined and found correct,

DAVID WALDIE,  
H. H. GODWIN-AUSTEN, *Major.*

ASIATIC SOCIETY'S ROOMS,  
*Calcutta, Jan. 1st, 1877.*

DISBURSEMENTS.				1876.	1875.
Brought over, Rs.	2,597	6	3	1,80,406	9 0
Lt.-Col. L. R. Kerr,	..	..	0 4 0		
Col. H. L. Thuillier,	..	..	0 3 0		
M. L. Dames, Esq.,	..	..	0 15 0		
Dr. J. Scully,	..	..	2 0 0		
H. F. Blanford, Esq.,	..	..	14 5 6		
E. H. Man, Esq.,	..	..	0 3 0		
Dr. T. R. Lewis,	..	..	0 4 0		
Dr. V. Richards,	..	..	0 5 0		
A. S. Harrison, Esq.,	..	..	2 10 0		
Md. Khodabux Khan,	..	..	0 10 0		
W. T. Blanford, Esq.,	..	..	4 6 0		
H. Buckle, Esq.,	..	..	0 11 0		
A. Anderson, Esq.,	..	..	0 1 0		
R. B. Shaw, Esq.,	..	..	9 11 0		
				2,633	14 9 1,947 5 4

## BALANCE.

In the Bank of Bengal, *viz.*

Account of Stoliczka Memorial Fund, .. 334 10 5

Account of Dr. Oldham Memorial Fund, .. 130 8 0

Account of Piddington Pension Fund, .. 70 11 2

Account of Asiatic Society of Bengal, .. 3,213 13 2

		3,749 10 9
Cash in hand,	..	218 6 3

3,968 1 0

Rs. 1,87,008 8 9

Examined and found correct,

DAVID WALDIE,

H. H. GODWIN-AUSTEN, *Major.*

# STATEMENT, *Abstract of the Cash Account,*

	RECEIPTS.	1876.	1875.
BALANCE OF 1875.			
In the Bank of Bengal, viz.			
Dr. J. Muir, ..	898 10 0		
O. P. Fund, ..	3,364 8 6		
	<u>4,263 2 6</u>		
Cash in hand, ..	144 7 5		
		<u>4,407 9 11</u>	
ORIENTAL PUBLICATIONS.			
Received by sale of Bibliotheca Indica, and			
by Subscription to ditto, ..	2,441 11 9		
Ditto Refund of Postage and Packing, ..	65 9 6		
Ditto Commission on Purchase of Postage Stamps, ..	0 8 0		
	<u>2,507 13 3</u>		
		2,872 6 3	
GOVERNMENT ALLOWANCE.			
Received from General Treasury at 500 Rs. per month, ..	6,000 0 0		
Ditto ditto Additional grant for the publication of Sanskrit Works at 250 Rs. per month, ..	3,000 0 0		
	<u>9,000 0 0</u>		
		9,000 0 0	
CUSTODY OF ORIENTAL WORKS.			
Saving of Salary, ..	30 6 3		
Ditto Fine, ..	0 8 0		
	<u>30 14 3</u>		
		2 2 9	
Asiatic Society of Bengal, ..	86 5 9		
Babu Braj Bhushana Das, ..	49 10 6		
Basel Mission Book Tract Depository, ..	5 1 0		
T. W. H. Tolbort, Esq., ...	5 14 0		
Babu Pratapa Chandra Ghosha, ..	30 14 3		
Sheoprasad Sadur, ..	2 7 0		
Adhur Sing Gour, ..	0 5 0		
Gopal Rao Hurry, Esq., ..	3 0 0		
Capt. G. A. Jacob, ..	0 1 0		
Ramjeebun Mookerjee, ..	15 0 0		
Venkata Krishna Modelier, ..	0 11 0		
Framjee Cowasjee Institute Native General Library, Bombay, ..	6 2 0		
Pandit Chandra Kant Tarkalankar, ..	1 2 0		
Babu Kaliprasad, ..	12 15 0		
	<u>219 8 6</u>		
		293 5 5	

Carried over, Rs. 16,165 13 11

## No. 2.

*Oriental Publication Fund, 1876.*

DISBURSEMENTS.		1876.	1875.
ORIENTAL PUBLICATIONS.			
Paid Packing charges,	.. ..	11 12 0	
Ditto Postage Stamps,	.. ..	137 8 0	
Ditto Freight,	.. ..	85 6 0	
Ditto Advertising charges,	.. ..	202 1 0	
Ditto Commission on Sale of Books, &c.,	.. ..	33 12 0	
Ditto Coolies for removing Books and Shelves, &c.,	.. ..	47 5 0	
Ditto Ticea Duffery for arranging Bibliotheca Indica,	.. ..	9 4 0	
Ditto Carpenters' workmanship and supplying Rafters for Racks,	.. ..	36 2 0	
Purchase of three Teakwood Racks,	.. ..	183 0 0	
Ditto Petty charges,	.. ..	7 11 9	
		<u>753 13 9</u>	<u>771 1 8</u>
CUSTODY OF ORIENTAL WORKS.			
Paid Salary of the Librarian,	.. ..	600 0 0	
Ditto Establishment,	.. ..	724 0 0	
Ditto Fee for Stamping Cheques,	.. ..	3 2 0	
Ditto Printing Expenses,	.. ..	0 10 0	
Ditto Printing of MSS.,	.. ..	1 0 0	
Ditto Printing of Books,	.. ..	3 0 0	
Ditto Printing of Papers,	.. ..	1 0 0	
		<u>1,332 12 0</u>	<u>1,291 2 0</u>
LIBRARY.			
Paid Purchase of MSS.,	.. ..	70 0 0	
		<u>70 0 0</u>	<u>6 6 6</u>
CATALOGUE OF SANSKRIT MSS.			
Paid Salary for Cataloguing Sanskrit MSS.,	.. ..	420 0 0	
		<u>420 0 0</u>	<u>360 0 0</u>
COPYING MANUSCRIPTS.			
Paid Copying MSS.,	.. ..	16 6 6	
		<u>14 6 6</u>	<u>157 0 3</u>
ĀṬṬA-ĀKṬARĪ.			
Paid Editing and Printing charges,	.. ..	445 0 0	
		<u>445 0 0</u>	<u>96 0 0</u>
GOBHILĪYA GRĪHYA SU'TRA.			
Paid Printing charges,	.. ..	224 0 0	
Ditto Postage,	.. ..	0 13 0	
		<u>224 13 0</u>	<u>140 5 0</u>
SĀHITYA DARPAṆA.			
Paid Printing charges,	.. ..	418 0 0	
		<u>418 0 0</u>	<u>0 6 0</u>
ĀKṬARNĀMAH.			
Paid Editing charges,	.. ..	192 0 0	
		<u>192 0 0</u>	<u>688 0 0</u>
SĀMA VEDA.			
Paid Editing and Printing charges,	.. ..	2,100 8 9	
		<u>2,100 8 9</u>	<u>1,220 10 0</u>
Carried over, Rs.		<u>5,971 6 0</u>	

RECEIPTS.	1876.	1875.
Brought over, Rs.	16,165 13 11	

Rs. 16,165 13 11

Examined and found correct.

DAVID WALDIE,  
H. H. GODWIN-AUSTEN, *Major*.

ASIATIC SOCIETY'S ROOMS,  
*Calcutta, Jan. 1st, 1876.*

DISBURSEMENTS.		1876.	1875.
Brought over, Rs.		5,971 6 0	
BIOGRAPHICAL DICTIONARY OF PERSONS			
WHO KNEW MUHAMMAD.			
Paid Editing and Printing charges,	..	710 8 0	
Ditto Copying charges,	..	127 8 0	
		<hr/>	338 0 0 25 0 0
AITAREYA ARANYAKA.			
Paid Editing and Printing charges,	..	1,536 11 9	
		<hr/>	1,536 11 9 353 0 0
CHATURVARGA CHINTÁMANI.			
Paid Editing and Printing charges,	..	1,220 0 0	
		<hr/>	1,220 0 0 610 0 0
TABAQAT-I-NAQIRI.			
Paid Printing charges,	..	1,079 10 6	
Ditto Freight,	..	5 0 0	
Ditto Postage and Cooley,	..	0 11 0	
		<hr/>	1,085 5 6 2 12 0
BHÁMATÍ.			
Paid Printing charges,	..	498 0 0	
Ditto Freight,	..	16 6 0	
Ditto Postage and Cooley,	..	1 3 3	
		<hr/>	515 9 3
TAMTIRÍYA SÁNHITÁ.			
Paid Editing and Printing charges,	..	334 10 0	
		<hr/>	334 10 0
KÁMANDAKÍ NÍTISÁRA.			
Paid Editing and Printing charges,	..	320 0 0	
		<hr/>	320 0 0
Asiatic Society of Bengal,	..	1,086 5 9	
Babu Braj Bhushan Das,	..	52 13 6	
Basel Mission Book and Tract Depository,	..	5 1 0	
Babu Bhaiya Lala,	..	5 3 0	
Adhur Sing Gour,	..	0 5 0	
Ramjeeb,	..	30 0 0	
Venkata	..	0 11 0	
Framjee Cowasjee Institute Native General			
Library, Bombay,	..	6 3 0	
Rutton Lala,	..	1 6 0	
Gopal Rao Hurry,	..	3 0 0	
		<hr/>	1,191 0 3 615 4 6
BALANCE.			
In the Bank of Bengal, viz.			
Dr. J. Muir,	..	898 10 0	
O. P. Fund,	..	2,140 12 10	
		<hr/>	3,039 6 10
Cash in hand,	..	113 12 4	
		<hr/>	3,153 3 2
		<hr/>	Rs. 16,165 13 11

Examined and found correct.

DAVID WALDIE,

H. H. GODWIN-AUSTEN, Major.



STATEMENT,  
*Conservation of Sanskrit MSS., in Account*

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Cr.

	1876.
Balance of 1875, .....	Rs. 4,370 0 11
Received from the Government of Bengal, the amount sanctioned towards the Conservation of Sanskrit MSS., being	
2nd Half of 1875-76, .....	1,600 0 0
Ditto ditto 1st Half of 1876-77, .....	1,600 0 0
Sale proceeds of 47 copies Notices of Sanskrit MSS., .....	47 0 0
Refund of the amount from Dr. Rajendralála Mitra, paid on the 14th September, 1875 for purchase of Sanskrit MSS. ....	1,200 0 0
Ditto Dr. from ditto ditto paid on the 8th September, 1876 for purchase of Sanskrit MSS., .....	1,000 0 0
Ditto of Postage Stamps, .....	0 11 0
Received from Bábu Nil Komul Banerjea in Deposit, .....	0 4 0
	5,447 15 0

Rs. 9,817 15 11

Examined and found correct.

DAVID WALDIE,  
H. H. GODWIN-AUSTEN, *Major.*

ASIATIC SOCIETY'S ROOMS,  
*Calcutta, Jan. 1st, 1876.*

NO. 3.

*Current with the Asiatic Society of Bengal.*

Dr.

1876.

Paid Salary for preparing Catalogue of Sanskrit MSS.,	360	0	0	
Ditto ditto for Translating the Sanskrit Catalogue, ....	240	0	0	
Ditto ditto for Travelling Pandit, .....	550	0	0	
Ditto Banghy expenses, .....	2	4	0	
Ditto Printing charges of Notices of Sanskrit MSS. Vol. III. Part III. and Vol. III. Part IV., .....	687	8	0	
Ditto Contingent charges for Travelling Pandit, .....	5	10	6	
Ditto Travelling Allowance for ditto ditto, .....	169	14	0	
Ditto Purchase of Sanskrit MSS., .....	800	10	0	
Ditto Copying charges of Sanskrit MSS., .....	91	4	0	
Ditto yellow paper for copying ditto, .....	7	8	0	
Ditto Fee to the Bank of Bengal for Stamping Cheques, .....	1	9	0	
Ditto Purchase of Stationery, .....	9	10	0	
Ditto Packing charges, .....	3	6	0	
Ditto Freight for sending Notices of Sanskrit MSS. to Messrs. Trübner and Co., .....	42	10	0	
Ditto Postage Stamps, .....	21	11	6	
Ditto Messrs. T. Black and Co. for preparing 13 plates and coloring 510 copies of each of the Notices of Sanskrit MSS., .....	367	3	0	
Ditto Dr. Rajendralála Mitra, as an advance on account of Travelling expenses for a Tour in search of Sanskrit MSS., .....	1,000	0	0	
Ditto Librarian, his Salary from May 1875 to April 1876, .....	150	0	0	
Ditto Dr. Rajendralála Mitra, for Travelling expenses to Patna, Benares, &c. including Railway fare, Carriage hire, &c., .....	346	10	0	
Ditto Present by way of Commission to Pandits and others, .....	36	0	0	
Ditto Packing Cases, Charges of Packing, Coolery, Boat-hire, and Railway fare for MSS., .....	13	3	6	
Ditto for Copying and Purchase of 138 Copies of MSS., .....	1,669	4	0	
Ditto Loan, to the Asiatic Society of Bengal, .....	1,000	0	0	
Ditto Petty Charges, .....	7	9	6	
Ditto Salary for Bearer, .....	84	0	0	
				7,667 7 0
BALANCE OF 1876.				
In the Bank of Bengal, .....	2,146	10	5	
Cash in hand, .....	3	14	6	
				2,150 8 11
				Rs. 9,817 15 11

Examined and found correct.

DAVID WALDIE,  
H. H. GODWIN-AUSTEN, *Major.*

ASIATIC SOCIETY'S ROOMS,  
Calcutta, Jun. 1st, 1876.

# STATEMENT NO. 4.

## Shewing the Assets and Liabilities of the Asiatic Society of Bengal on the 1st January, 1877.

ASSETS.		1876.	1875.	LIABILITIES.		1876.	1875.
In Bank of Bengal,...	Rs. 3,749 10 9		3,858 2 3	Salary and Establishment for December, 1875,		332 2 8	348 10 8
Cash in hand, .....	218 6 3		160 9 4	Dr. Stoliczka Memorial Fund, .....		334 10 5	812 5 2
Government Securities,		3,968 1 0		Dr. Oldham Memorial Fund, .....		130 8 0	0 0 0
Ditto ditto on account of Piddington Pension Fund, .....		1,53,000 0 0	13,200 0 0	Piddington Pension Fund, .....		70 11 2	0 0 0
		500 0 0		Baptist Mission Press, Printing charges, Journal, Part II. No. III. of 1876,	420 9 0		
		1,57,468 1 0	17,218 11 7	Royal printing paper, ....	9 9 9	430 2 9	1,244 12 0
OUTSTANDING.							
Admission fees, .....		160 0 0	32 0 0	Oriental Gas Company Limited, Supplied Gas, .....		28 0 0	0 0 0
Subscriptions, .....		6,270 0 0	6,561 0 0	Messrs. Llewellyn and Co., for furnishing Marble Tablet for bust, .....		20 0 0	0 0 0
Sale of Journal, .....		278 1 9	358 7 9	Statesman Press for advertising Monthly General Meeting, .....		10 8 0	0 0 0
Subscription ditto, .....		567 13 9	607 9 9	O. P. Fund on Loan, .....		1,000 0 0	0 0 0
Sale of Library, .....		162 9 0	152 9 0	Conservation of Sanskrit MSS. on Loan, to Asiatic Society, .....		1,000 0 0	0 0 0
Due by the Bank of Bengal Fund Account, .....		7,438 8 6	7,711 10 6				
		364 13 7	275 5 1				
		Rs. 7,803 6 1	7,986 15 7			Rs. 3,356 11 0	2,405 11 10

We have examined this account and see no reason to doubt its correctness.

ASIATIC SOCIETY'S ROOMS,  
Calcutta, Jan. 1st, 1876.

DAVID WALDIE,  
H. H. GODWIN-AUSTEN, Major.

# STATEMENT NO. 5.

*Shewing the Assets and Liabilities of the Asiatic Society of Bengal, O. P. Fund, on the 1st January, 1877.*

ASSETS.		1876.	1875.	LIABILITIES.		1876.	1875.
In the Bank of Bengal, viz.				Salary and Establishment, .....		110 5 4	110 5 4
Dr. J. Muir, .....	Rs. 898 10 0			Dr. Rajendralala Mitra editing charges			
O. P. Fund, .....	2,140 12 10			Agri Purana, Fas. IX., .....		153 0 0	144 0 0
	<u>3,039 6 10</u>			Baptist Mission Press printing charges Akbaramah			
Cash in hand, .....	113 12 4			Vol. II. Fas. I., .....	496 0 0		
	<u>3,153 3 2</u>			Ditto ditto Ain-i-Akbari, Fas. IX., .....	253 0 0		
				Friend of India, advertising Sale of Books, .....		749 0 0	0 0 0
Government Allowance for Decr., 1876,	750 0 0			Hindoo Patriot Newspaper ditto ditto,		20 0 0	0 0 0
Bibliotheca Indica Sale and Subscription,	1,659 13 4			Prema Chandra Chaudhury, Salary for December, 1876, .....		40 0 0	0 0 0
Asiatic Society of Bengal on Loan, ....	1,000 0 0			Dr. J. Muir, .....		898 10 0	898 10 0
	<u>Ra. 6,563 0 6</u>					<u>Rs. 1,990 15 4</u>	<u>1,152 15 4</u>

We have examined this account and see no reason to doubt its correctness.

ASIATIC SOCIETY'S ROOMS,  
Calcutta, Jan. 1st, 1876.

DAVID WALDIE,  
H. H. GODWIN-AUSTEN, Major.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JANUARY, 1877.

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The Monthly General Meeting of the Asiatic Society was held on Wednesday, the 17th January, 1877, at 9 o'clock P. M.

The Hon. Sir E. C. Bayley, K. C. S. I., President, in the chair.

The Minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the author, a copy of "Remarks on the Sikshâs," and "Kât-yâyana and Patanjali, their relation to each other and to Pânini." By F. Kielhorn, Ph. D.

2. From the Superintendent Geological Survey of India, a copy of a work entitled "Eastern Persia, 1870-72"; Vol. I, "Geography with Narratives", by Sir F. J. Goldsmid; and Vol. II, "Zoology and Geology", by W. T. Blanford.

3. From the author, a copy of the "Arian Witness, or the Testimony of Arian Scriptures in corroboration of Biblical History and the Rudiments of Christian Doctrine." By the Rev. Dr. K. M. Banerjea.

4. From K. Kuroda, Chokuwan of Kaitakshai, Tokei, Japan, a copy of a work, entitled "Reports and Official Letters to the Kaitakushi", by Horace Capron, Commissioner and Adviser, and his Foreign Assistants.

5. From Bábu Rám Dás Sen, a copy of his "Aitihosika Rahasaya, Vol. II.

The following gentleman, duly proposed and seconded at the last Meeting, was balloted for and elected an ordinary Member.

Kumara Radha Kishor Deb, Juvráj of Hill Tiperah.

Dr. J. Muir, proposed by the Council at the last Meeting as an Honorary Member, was balloted for and duly elected.

The following are candidates for ballot at the next Meeting :

1. Mr. William Croke, C. S., Gorákhpur, N. W. P., proposed by Mr. V. A. Smith, seconded by Mr. H. Blochmann.

2. Capt. G. F. L. Marshall, R. E., proposed by Mr. J. Wood-Mason, seconded by Major H. H. Godwin-Austen.

THE PRESIDENT announced that the Council had contributed a sum of Rs. 500 in aid of a Zoological Exploration of Tenasserim, and that the same had started fully equipped under the charge of Mr. Limbörg. The results of the expedition would be published in the Society's Journal.

THE PRESIDENT exhibited the following silver coins and said—

"The ten coins, which form the remainder of the batch recently purchased from the Persian Gulf, belong to the group termed by Mr. Edward Thomas "Partho-Persian", which probably belonged to minor rulers in more or less subordination to the Parthian kings, the style of whose coins they follow in many respects.

"The coin which I have marked No. 1 appears to be identical with that marked as No. 3, of the plate given by Mr. Thomas in his paper on the Pehlevi Legends on Arsacidan Coins. Unfortunately the present coin is in bad preservation. No. 2 is a small coin of the same general type, *i. e.* with a head on either side, but the reverse head is bearded. The legend on the obverse is absent, but there is one on the reverse of which a few letters may be perhaps read as 𐭪𐭣𐭥 "Aeza". All the other coins have the "Mobed" and the fire altar on the reverse, and of these No. 3 seems to assimilate with the coin numbered by Mr. Thomas as 6 on his plate, the legend of which he admits to be doubtful. Nor can I venture to offer any decipherment of my own. The coin, though in good preservation, is very rudely executed.

"The coin I have marked as No. 4, approximates to that figured as No. 8 of Mr. Thomas's plate, but the legend in front of the fire altar seems to read not quite as in his coin ریتھشتار (۱), (A)rethashtar, or Artaxerxes. I cannot pretend to offer any decipherment of the other coins; they are of rude execution, and the alphabet is one with which I am not familiar. I notice that two of the heads have, instead of the high Parthian cap, a triple pointed crown."

The following papers were read—

1.—*On Himalayan Glaciation.*—By J. F. CAMPBELL, Esq.  
(Abstract.)

MR. CAMPBELL's observations refer to the outer Himálayan region between the Ganges and the Rávi, including the higher hills at Masúri and to Narkandá, north of Simlá. Within this area he could not find one 'perched block,' one hog-backed ridge, or one rounded valley. Everywhere far and

near he found the V-shaped form of denudation, attributable solely to rain and river action. In the superficial or the older conglomerates, however coarse, he could find no case of an erratic boulder-bed, nor anything like a moraine, and nothing to suggest the agency of floating ice in lake or sea. He considers that the great blocks so freely distributed in the Kánggrá valley are sufficiently accounted for as torrential deposits, by the very rapid fall of the streams from the Dhaoládhar range, aided probably by a once heavier rainfall and a corresponding increased snowfall on the summits. There is nothing, he thinks, to support the notion of an 'Ice-cap', or even of a 'glacial period', in the now current sense of that term.

The author gives some interesting antiquarian observations upon the traditions connected with the great boulders.

Mr. MEDLICOTT agreed with Mr. Campbell that no actual glacier had ever reached the Kánggrá valley, but thinks that ice had much more to say to the big stones than Mr. Campbell allows. The former great extension of Himálayan glaciers is established from indisputable observations in Sikkim and elsewhere. At that time ice must have been in force on the Dhaoládhar range, close over the Kánggrá valley. Further, the period of this Himálayan glaciation agrees, so far as can be determined, with the ice-age of the western continents.

Mr. H. F. BLANFORD said that he had expected that Mr. Campbell's paper would be much more subversive of accepted views, than proves to be the case. The notion of an ice-cap extending from the pole over the Himálaya to the neighbourhood of the equator, against which Mr. Campbell's argument is directed, was to him a new one, and, as far as he was aware, stood in no need of refutation. As regarded the view held by himself and not a few other Indian geologists, *viz.*, that in the latest geological times there had been a very great extension of the existing glaciers, and that glaciers were then formed at levels far below the present snow line, the validity of the existing evidence of Dr. Hooker's and Mr. W. T. Blanford's observations in Sikkim, and Major Godwin-Austen's in the Nágá Hills, did not seem to be in the least affected by Mr. Campbell's failure to discover ice markings on the great boulders on the flanks of the Dhaoládhar. It would be in the recollection of members of the Society that in papers published in the Society's Journal, Mr. W. T. Blanford had recorded the existence of moraines in Sikkim down to 6000 feet, and that Major Godwin-Austen has figured and described the beautiful examples of moraines, which he had discovered in the Nágá Hills at elevations of no more than 4500 feet. Having lately visited Nainítál, he thought he might adduce the site of this well-known station as another example of glacier action. The form of the valley, more especially the northern face, is strongly suggestive of ice denudation, the face of the slope



being planed off, as by the friction of a glacier; and presenting none of those subordinate ridges and spurs which are especially characteristic of drainage denudation. The lake is dammed below by a heap of blocks, some of gigantic size, which appear to be of the same hard limestone as forms the ridge at the head of the valley. Having been only two days in Nainítál, he had been unable to investigate the question satisfactorily, but his impression was that the lake was closed by a moraine. A leisurely examination of Nainítál and the other lakes in the vicinity would be an interesting and profitable employment for a geologist passing a season at one of the Kamáon hill-stations. Nainítál is at an elevation of only a little over 6000 feet, so that the supposed origin of the lake would fit in well with the facts recorded by previous observers. Glaciers do not now descend even in the Sikkim Himálaya below 14,000 feet, and to bring them down to 4500 would imply a reduction in the mean temperature of about 20° Fahrenheit.

He was quite unable to accept Mr. Campbell's suggestion that any considerable extension of the existing glaciers of the Himálaya could be accounted for by an increased supply of vapour, such as would be afforded, were, for instance, the Indus valley covered by the sea. The outer slopes of the Sikkim Himálaya now receive some of the heaviest rainfall in the world, the annual average recorded at Buxa Fort being 240 inches; yet the glaciers of Sikkim do not reach below 14,000 feet. His own belief was that the former extension of the glaciers could be explained only by a very great depression of the general temperature, possibly a reduction of the sun's heat, since the sun is known to be a variable star of short period, and may be so to a much greater extent, in long periods. But he did not think the evidence pointed to a greater reduction than he had suggested.

Major GODWIN-AUSTEN said—I quite concur in the remarks of Mr. Medlicott on the paper we have just heard read. In Kashmír undoubted traces of glaciers are to be seen, as low as 5000 feet in all the large valleys, in the grooved surfaces of the rocks on the sides of the valleys; and such glaciers once extended down to the gorges where the larger rivers enter the plain of Kashmír. Even at a lower elevation in the Jhílam valley, below Bárahmúlá, traces of such action are to be seen.

Very large masses of stone can be carried for long distances by the action of water alone, and I have seen many 10 to 12 feet in length, carried along on the bursting of a small glacial lake. When the Dhaoládhár range was covered with ice and snow, down to within 1000 or 2000 feet of the place where the large blocks alluded to by Mr. Campbell now lie, it is easy to conceive their mode of transport and deposition being due to the proximity of those old Dhaoládhár glaciers.

Dr. H. CAYLEY said—The power that floating ice possesses of carrying large blocks of stone long distances from the glaciers whence the ice was

derived is well shown in the Nubra Valley in Ladák. In this valley, both below its junction with the Shyok and also up the valley of the Shyok river, are to be seen here and there enormous blocks of granite, some as big as a cottage, lying at various distances from the bed of the river. These blocks are from the mountains near the Kumdán glaciers. A few years ago, these glaciers extended across and blocked up the upper valley of the Shyok river. After a time, the ice barrier gave way before the force of the water above, and enormous masses of ice were carried down by the flood through the Shyok and Nubra Valley, and deposited these blocks of stone in their course.

2.—*An Imperial Assemblage held at Delhi 3000 years ago.*—By RÁJENDRA-LÁLA MITRA, LL. D.

(Abstract.)

The ceremony of Imperial baptism was, in ancient times, called the *Rájasúya*, and the Aitareya Bráhmaṇa of the Rig Veda gives a list of ten persons who had celebrated it in remote periods of antiquity. The one best known to the people is, however, that which was celebrated by the Pándava brothers. It had a twofold character; first, the subjugation of a large number of princes and chiefs who had to acknowledge allegiance and vassalage; and secondly, a round of sacrifices and ceremonial observances spreading over a period of one year and a fortnight, from the full-moon day of March to the first new-moon of the year following. The observances of the first four months were in some respects similar to the Lent of the Christian Church. On the last day, after the offering of many oblations to the fire, the chanting of innumerable Sáma hymns, and repeated invocations of the Vedic gods Indra, Savitá, Rudra, Soma, and the Maruts, eighteen different kinds of fluids were consecrated and showered on the king through a golden rosehead. The king was then made to take three steps forwards towards each of the four quarters of the globe, and then, mounted on a chariot, driven towards a herd of cattle, the foremost animal of which he touched with the tip of his bow in token of his having accomplished a successful cattle-lifting raid. Sacrifices of a bull, a pregnant heifer and some goats next followed. The king offered an *arghya* to the most revered among his guests, and received the allegiance of his allies, tributaries, vassals, and friends; and the ceremony was brought to a conclusion by the priests offering to the newly-anointed sovereign a cup of Soma beer and a goblet of arrack, which he quaffed. The object of the ceremony is stated to be that the person inaugurated by it "should conquer in all the various ways of conquest; to subjugate all people; that he should attain to leadership, precedence, and supremacy over all kings, and attain everywhere and at all times to universal sovereignty, enjoyment of pleasures, independence,

distinction as a king, the fulfilment of the highest desires, the position of a king, of a great king, and supreme mastership; that he might cross with his arms the universe, and become the ruler of the whole earth during all his life, which may last for an infinitely long time; that he might be the sole king of the earth up to its shores bordering on the ocean.

Owing to the lateness of the hour, the President postponed the reading of the following papers to the next meeting—

1. *Rough Notes on some Ancient Sculpturings on rocks in Kamáon, similar to those found on monoliths and rocks in Europe.*—By H. RIVETT-CARNAC, C. S.

2. *On the Final Stage in the Development of the Organs of Flight in Orthoptera.* By J. WOOD-MASON.

3. *List of the Mollusca collected by Dr. J. Anderson in Yunnan and Upper-Burmah, with descriptions of new species.* By G. NEVILL, C. M. Z. S.

4. *List of the Mollusca collected by the late Dr. Stoliczka when attached to the Embassy under Sir D. Forsyth in Yarkand and Ladak, with descriptions of the new species.* By G. NEVILL, C. M. Z. S.

The Meeting then adjourned.

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At the request of the Government of Bengal, the Council have much pleasure in reprinting, for the information of the members of the Society, the following sketch by Mr. Cust of the progress of the researches in the Non-Aryan languages of India, which was originally written for the London Philological Society. They agree with Mr. Cust that vocabularies of the Non-Aryan languages are not wanting; but that it is desirable to proceed beyond that stage of inquiry and encourage the composition of practical grammars, and thus lead the way to the drawing up of comparative grammars for the several families of languages.

The Council have every reason to hope that this important *desideratum* will in course of time be supplied; and that some Members of the Society may have leisure to carry out the valuable suggestions made by Mr. Cust.

#### On the Non-Aryan Languages of India.—By R. N. CUST, Esq.

In the Annual Report [of the Philological Society] for 1875 a note is inserted on the Aryan and Southern Dravidian languages of British India and its Political Dependencies, using the latter phrase in its most extended sense without reference to the texts of treaties. The out-turn of grammars and dictionaries recorded in that note represents the work of the last quarter of a century. It is now proposed to indicate the languages spoken by residents of British India (exclusive of British Burmah) other than

Aryan and Southern Dravidian. Our researches will extend to tracts of country under native sovereigns more or less dependent, and to the wild tribes which inhabit the mountain fringe of the eastern border, or the imperfectly known uplands of Central India. In this direction emphatically lies the work of the next quarter of a century, for the harvest is ready, and the opportunity is offered, if workmen are forthcoming. For scant vocabularies and grammatical notes must be substituted in all cases good practical grammars, and in some cases scientific grammars, which will in due course be followed by scientific comparative grammars and dictionaries, embracing cognate groups, and thus making substantial contributions to the sum of linguistic knowledge in a most interesting direction—*viz.*, just at the point, where the monosyllabic structure is giving way to the earliest development of the agglutinating method.

Following the same geographical order as the one adopted in last year's note, we commence at the northern angle of India: at the spot where the three religions of Mahomet, Buddha, and Brahma, with their respective languages and written characters, converge. This spot is situated in the territory of the Maharaja of Cashmere, one of the great feudatories of the Empire. To the north of Cashmere proper is Little Tibet, or Bultistan, the capital of which is Iskardo, on the river Indus: in the population there is an admixture of Mahomedanism: the language is ostensibly Bhot or Tibetan, but there is occasional use of an Arabic written character; in fact it is debatable ground: but in the adjoining Middle Tibet, the capital of which is Ladakh, the population is Buddhist, and the language Tibetan, written in the character peculiar to that language, though derived from the Nagari. The population of both Little and Middle Tibet is civilized in the Asiatic sense, and resides on the highway of a future commerce betwixt British India and the great plateau of Central Asia, the scene of the future conflict betwixt China, the Mahomedan powers, and Russia.

Moving south-east, and crossing the Chenab river in the mountains, we enter the Province of Lahoul or Spiti, within the District of Kangra, and a component part of the Province of the Punjab. There, amidst lofty mountains, in hitherto inaccessible tracts, amidst a sparse and pastoral population of Buddhists, the school-master and missionary have located themselves, and in 1865 and 1866, at Kyelang, the capital of Lahoul, the Rev. H. A. Jaeschke, a Moravian missionary, lithographed a short practical grammar in English of the Tibetan language, with special reference to the spoken dialect and the wants of his mission, and a Tibetan and English Dictionary. He is now employed in Europe in the preparation of a superior work on the same language. This, perhaps, is the only portion of British India proper where the Tibetan language is spoken; but Tibet, with its capital Lhasa, is conterminous with the territories of our ally the Maharaja

of Nepal, and its prolific literature finds its way from native printing-presses of the Chinese type into that kingdom. Poor traffickers and monks annually visit Kathmandu, and sell books of inferior pretensions, as well as religious tracts. It is a language in the stage of transition from the monosyllabic to the agglutinating class, but akin to Chinese, of which empire Tibet is an integral portion: the people are Buddhists, and allow of no communication, even by letter, with British India, its Government or people: but from India many centuries ago they borrowed their religion, and the staple of their literature, which consists chiefly of religious works, translations from Sanskrit. The first grammar of this language was compiled by Csoma di Körös, after a long residence on the frontier, and published at Calcutta in 1834, followed by a dictionary: to this succeeded a grammar published in the German language, in Russia, by Schmidt, in 1841; and another in French by Foucaux at Paris in 1858: neither of the two last-mentioned scholars had visited India, and they are but followers of Csoma di Körös. Parts of the New Testament have been translated into Tibetan, but there is an absolute dearth in the whole of Europe of Tibetan scholars, and at a late meeting of the Geographical Society of London, a letter was exhibited from the Lama to a British officer, upwards of one hundred years old, which, whatever may have been the case then, is totally beyond the existing knowledge of the linguistic world in Europe. It is understood that there are several dialects of Tibetan, and, considering the vast extent and mountainous character of the great plateau, there is reason to expect scores of dialects. There are four variations of the alphabet—the first is in *capitals*: the second *small* letters: the third *cursive*: and the fourth an exotic, supposed to be identical with one of the Nepaulese alphabets: all are derived from the Nagari.

Betwixt Lahoul and the Nepaulese frontier a considerable extent of mountainous country extends, occupied from time immemorial by a population professing Hinduism, but with some suspiciously non-Aryan customs, such as polyandry, speaking a dialect of Hindi, and under the rule of petty Rajas, in absolute dependence on the Government of British India. In one solitary tract north of the river Sutlej, and deep in the Himalaya, is found to exist a population speaking a non-Aryan language; this is Kunawur, a portion of the territory of the Raja of Bussahir, a small tract of mountains of an enormous elevation, occupied by a population of less than ten thousand, the majority of whom are Buddhists, and speak a language called Koonawuri or Milchan, akin to Tibetan, a vocabulary of which was compiled by Captain Herbert. There are said to be a variety of dialects even in this narrow compass. The people, though simple in habits, are not uncivilized in the Asiatic sense, and in the chief Buddhist temple is an extensive library of Buddhist works.

Crossing the rivers Jumna and Ganges in the mountains, and traversing the Hindu hill tracts of Kumaon, we reach the upper portion of the river Gogra or Surju, and find ourselves within the boundaries of the kingdom of Nepaul, within which, in its long extension of many hundred miles to the frontiers of Sikkim, we find a score of non-Aryan languages, spoken by tribes, partly Hindu, partly Buddhist, and partly Pagan, dwelling in the valleys of the Himalaya, where the loftiest range on the face of the globe separates Buddhism from Hinduism, the Mongol from the Aryan, the Tibetan language and its congeners from the great Sanskritic vernaculars. This group may be called the 'Himalaic': to call them Bhutiya is incorrect linguistically, as that word in its general sense is synonymous with Tibetan, and in its special sense with the dialect of the kingdom of Bhutan: to call them sub-Himalaic is geographically incorrect, and some of the tribes inhabit the highest valleys: to call them Gangetic is to mislead, as they are spoken hundreds of miles from the Ganges, although the drainage of the southern watershed finds its way to that river. Here the most eastern wave of Aryan civilization rolls up against as impassable a barrier, as the Kelts on the western wing of the Aryan army found in the Atlantic Ocean. Had not the mountains presented a physical obstacle, the elder culture, which Tibet had imported from China, would have given way to the fresher culture established at Kanouj and Benaras: in spite of the mountain barrier, Tibet received from her Aryan neighbours her religion, her literature, and her written character, but she has conserved to this day her own language, and her own type of civilization, by enforcing with success a system of absolute isolation, which it must be the work of the next quarter of a century to break down.

All the languages of this group are more or less connected with Tibetan. Analogies with other groups are asserted: the great ethnological question lies before us, whether all these tribes crossed the Himalaya from Tibet at a period antecedent to the introduction of the Buddhist religion, or whether some migrated from Central India, or supplied colonies to Central India, from which they are now separated, and have been for centuries separated, by the great wave of Aryan immigration down the valley of the Ganges. It is maintained that their numerals, pronouns, and postpositions, are frequently identical. The Himalayan range is intersected by four great feeders of the Ganges, the Surju or Gogra, the Gandak, the Kosi, and the Tista: there is also a transverse section of lofty hills, of mountainous region of moderate height, and submontane tracts. In the lofty sites are found the Tibarshad and Hundesi languages. In the submontane tracts are found the Chepang, Vayu Hayu, Kusunda. In the western portion of the middle region we come across the Sumwar and Surpa; in the central portion is the important Newar, the Magar, Bramhu, Darahi,

Denwar, Pahri, Kaswar, Pukhya, Thaksya. In the eastern portion are the Limbu, Kiranti, Murni, and Gurung. In the adjoining kingdom of Sikkim is the Lepcha language, and in the kingdom of Bhutan, or Bhutant (the end of Bhut), is the Bhutiya proper. We have it on the highest authority that none of these languages are intelligible to others than the speakers, and that, with the exception of the Newar and Lepcha, they are absolutely devoid of literature and of a written character. The Newar has a few translations, but no dictionary or grammar. Mr. Hodgson has supplied a comparative treatise of Newar and Tibetan.\* The Newar has no less than three alphabets, but all derived from the Nagari.

The sanitarium of Darjiling is situated in Sikkim, and this has led to the Lepcha language being utilized by Protestant missionaries. Portions of the Bible have been translated into it, and other books of an elementary character: this language is closely allied to Tibetan, but according to Csoma di Körös it had a non-Tibetan alphabet. A dictionary of this language had long been in preparation by Colonel Mainwaring, a resident at Darjiling, and a manuscript grammar by the same hand is in existence. The Lepchas and their neighbours, the Bhutiyas, are both Buddhists; so far they resemble each other, but the latter burn their dead like Hindus, have no form of marriage at all, and practise polyandry; the former bury their dead, and are monogamists. This is a fair instance of the extraordinary diversities of customs, cutting to the root of family life, under the same religious externals. With regard to the Kiranti language, it is asserted, that the complex pronominalization of the verb points to a special connexion with the Mundari, or Kolarian, language of Central India: analogies of formation of the same language with the Dravidian are also indicated. The tribe is also Pagan in the midst of Buddhists.

With the above exceptions we know little or nothing of any of these twenty-two languages or dialects of the same language (for we cannot say which), beyond the vocabularies carefully collected by Mr. Bryan Hodgson, late Resident of Nepal, a man who has done by patient research, and the devotion of a life, more for the advance of linguistic knowledge than any of his contemporaries. All subsequent vocabularies seem to be but repetitions of his labours. One of the dialects of Bhutiya proper appears to be called Changlo: the people who speak it are in the middle region of altitude, of a dark colour, which is indicated by their name, which means 'black'. This language introduces the name of another meritorious labourer in this great and unexplored field. Mr. William Robinson, Inspector of Schools of Asam, in 1849 compiled a short but serviceable grammar, or rather

\* There are Grammars and Vocabularies of Tibarshad in the Journal of the Bengal Asiatic Society; and a Grammar of the Magar, published by Mr. Beames, 1869.

wrote down some practical grammatical notices of this dialect,\* which give a far better insight into its structure and characteristics than any vocabulary : this excellent service he rendered to several other languages spoken in the neighbourhood of the Asam valley, in a manner well calculated to bring out the salient features of each. The alphabet of the Changlo is the same as the Tibetan, to which language it bears a close resemblance. A reprint of Mr. B. H. Hodgson's scattered papers, revised and corrected by that veteran scholar, has long been ready for the press, and one volume has actually appeared : the second volume is anxiously expected, as it will contain a reprint of the author's papers on the Kooch, Bodo, and Dhimal, on the one hand, and of the Váyú and Báhing on the other, and we can state, on the authority of Mr. Hodgson, that there is distinct evidence of the existence of two classes of languages : one of them, represented by the Váyú and Báhing, may be called the pronominalized or complex type : the other, represented by the Newar, Lepcha, and others, is the non-pronominalized or simple type. By the term is meant the use of the pronouns in the form of affixes and suffixes, the most familiar instance of which is known to us in the Hebrew language. It is clear, therefore, that the present classification of these languages is only provisional.

The Himalaic group may be said to have no future before them, and they only await the time to be improved off the face of the earth : under ordinary circumstances it might have been expected that to one of the group at least—notably the Newar—might have fallen the chance of becoming the political language of the whole tract, and thus (like the South Saxon, and the patois of the Isle de France) developing itself into a national language. But such can never be, for the intrusive Khass, or Parbatia variety of the Aryan vernacular of India, under the name of Nepalese, is already established at Kathmandu, the capital of the Gurkha dynasty. The civilization and religion of the court and the nobles is Hindu, and as this gradually extends, all that is Tibetan and Trans-Himalaic will be trodden down by its powerful and vigorous rival, which receives its new ideas from India, and not from Tibet. The non-Aryan languages are already affected by their Aryan neighbour, and are charged more or less with loan-words, and in some cases even the numerals have given place, and such a change made, that the classification of the living language begins to be ambiguous. As an instance of transition these languages will remain objects of interest, but no more.

Proceeding onwards in a south-easterly direction we come upon new languages, which, for the sake of sub-dividing a large subject, rather than from any well-defined distinctive type of language, have been grouped under the head of Lohitic, a fanciful and inappropriate name from one of

\* The vocabularies and grammatical notices alluded to are to be found in the *Journal of the Bengal Asiatic Society.*



the less familiar names of an affluent of the Burhamputer or Sampu, which, entering British India at the extreme eastern point of the valley of Asam, for some distance flows westward betwixt two ranges of hills: at a certain point the southern range ceases, and the great river flows round this point, and altering its course discharges itself into the Bay of Bengal: on each side of this river, as it flows through the valley, are tribes speaking distinct languages, with a population calculated at little less than one million. We shall perceive, when we look at them closer, that, except in a geographical sense, or for temporary convenience, this grouping cannot be maintained. It was the original opinion of Mr. Hodgson that all these languages were Tamulian, a general phrase, by which he intended non-Aryan, or aboriginal. Dr. Caldwell has convincingly shown that, if by Tamulian was meant Dravidian, of which group Tamil is the chief member, the analogies pointed out betwixt Dravidian and these languages are less numerous, and of less essential character, and less distinctive, than the analogies which exist between the Finnish and the Dravidian, of a vague and structural character common to all languages of a Scythian origin. Max Müller maintains, that no trace of Dravidian has as yet been discovered north of the Ganges. In the Dravidian, which is at a much more advanced stage of the agglutinating class, there is an entire absence of intonation; while in the Lohitic languages, as in the Chinese, they are conspicuous: indeed, Mr. Robinson describes four different intonations prevalent in the language bordering the Asam valley; and he maintains, that all these languages were originally monosyllabic, though gradually passing into the earlier stage of agglutination.

The first in order, as we enter the valley, are the Bodo, called also Borro and Kachari, and Dhimal, of which Mr. B. Hodgson has published a grammar and vocabulary. The same author furnishes particulars and a vocabulary of the Kooch language: the inhabitants of Kooch Behar have abandoned their ancient agglutinating language, and adopted a bad Bengali: they have become partly Muhammadan and partly Hindu: a small section have clung to their ancient faith and language, which is known as Pani-Kooch, and an examination of this residuum of an almost extinct unwritten language has led Col. Dalton to found the opinion, that it belongs to the Dravidian family, and has no connexion with the Kooch. The Kachari language, above alluded to, is also known as Mech. Mr. Robinson has supplied a grammar of this language, and Major Lance, Deputy Commissioner in Asam, has another in preparation: there is no written character, and the number of people who speak this language amounts to 60,000.

Following the range of mountains eastward, we come upon a race of downright savages and Pagans, practising polygamy and polyandry, who receive a black-mail from the Government of British India to compensate

for the lost privilege of making raids on the peaceful settlers in the valley: the Aka, whose language is known to us by a vocabulary prepared by the Rev. Mr. Brown, and another in the *Journal of the Bengal Asiatic Society*; the Abor, of whose language we have a vocabulary prepared by Captain Smith; the Doffla, of which we have a grammar by Robinson: the Miri, of whose language we have a grammar prepared by Mr. Robinson; this tribe appear to have supplied interpreters to communicate with the others: and it is asserted that the word 'Miri' means 'go between', and is identical with the word 'Meriah' of the Khonds, so famous in connexion with the human victims sacrificed by that tribe; the Mishmi, of whose language we have a vocabulary by the Rev. Mr. Brown. These tribes extend back through unknown tracts to the frontier of Tibet, and are under a very imperfect control on the part of the Government of British India.

At this point—the head of the Asam valley—we cross the Burham-puter River, and find traces of new linguistic influence, for we are not far distant from the boundaries of China proper; and the Khamti language, of which we have a grammar by Robinson, is a member of the great Thai or Shan family, of which the Siamese is the political head. This tribe is but the representative of much larger and unknown hordes in Bor Khamti within the Burmese kingdom: they are civilized Buddhists, and have friendly relations with the Anglo-Indian authorities. At one period the Shans conquered the whole valley of the Burhamputer: the settlers assumed the name of *Ahām*, from the Sanskrit *asama*, 'unequalled': like the Normans in France, they gradually lost both their language (Shan) and their religion (Buddhist), and still constitute a large portion of the population of the valley, under the name of *Ahóm*, as Asamese-speaking Hindus: only a few priests have preserved the ancient religion. It is worthy of remark that the valley is called Asam, and the people call themselves *Ahāma* from *Asāma* also. There is another Shan language, the Aiton, of which we have a vocabulary in Sir G. Campbell's *Specimens of Languages*. The Khamti has a strong resemblance to the Siamese: it is purely monosyllabic, and more strongly accented than the other languages on the Asam frontier: it is in some degree connected with the Chinese itself, as the intonations are so finely modulated, that sounds organically the same express a totally different idea: inflections are unknown: the alphabet is derived from the Burmese.

Adjoining the Khamti is the Singpho tribe, whose language occupies a transitional position betwixt Tibetan and Burmese: one-fourth of its vocables are allied to Burmese, and one-fourth to Manipuri. This tribe is also the representative of a much greater horde lying behind, known as the Kakhien, who occupy the hilly tract betwixt Burmah and Yunan in China. Mr. Robinson, assisted by Mr. Bronson, has compiled a grammar of the

language : it is said to have a Shan alphabet. The Singhpos are civilized, but Pagans. It must be remembered that the point at which the Burhamputer bursts the mountain rampart into India is linguistically, politically, and ethnologically, one of the highest importance. The last and weakest tidal stream of the great Aryan river of religion, language, and civilization, flowed languidly up the Asam valley. More than once in history it has been met by a Shan counter-current, and may be met again. The incursion of the border-tribes into settled valleys is often an unwilling effort to escape from a superior force propelling them from their own haunts. By this outlet no doubt in times past the population of India has received great additions, though the superiority in number and calibre of the invaders from the North have borne them down ; and the Aryan settler under Hindu, Muhammadan, and Christian rule, has held its own.

The distance on the map from the extreme point of the southern mountains of the valley of Asam to Rajmahal, the extreme point of the Vindhya range, is, as the crow flies, not so great as to forbid the idea that India has been occupied at remote periods by pre-Aryan immigrants from the gorge of the Burhamputer ; but we await a more scientific comparison of languages, and more complete ethnological research, before the theory can be firmly substantiated, that the so-called Nisháda black aborigines were actually immigrants from the East.

After crossing the Burhamputer, the mountains return on the south side of that river in a westerly direction, enclosing the valley within a horse-shoe. Next to the Singhpo come the atrocious savages and Pagans, the Naga, over part of whose territory the Anglo-Indian Government has thrown a loose control, the nature of which can be best illustrated by the fact that within the last year they have killed their English Superintendent. Behind these lies the Burmese empire, and beyond the boundary the country is absolutely unknown : there are numerous clans of these turbulent highlanders, with a variety of dialects : of one at least Mr. Robinson, aided by the Rev. Mr. Brown, has prepared a grammar. The vocabularies of several of the Naga tribes are in the *Journal of the Bengal Asiatic Society*. A vocabulary of ten dialects has been published in the *Journal of the American Oriental Society*.

Next in order along this range are the Khasia or Cossiyah, and Jyntea, remarkable for their republican form of government and their monosyllabic language, akin to the Thai family, of which there is an excellent grammar by the Rev. Mr. Pryse, and an Anglo-Khasia dictionary by the Rev. Mr. Roberts : also a grammar by Robinson, and another published at Berlin by W. Schott : there is also an essay by the late Baron H. C. von der Gabelentz, published at Leipzig, 1850 : the New Testament has been translated into this language. They were Pagans.

Proceeding westward we come to the Garo tribe: their language has been thoroughly studied, and translations made into it by the American missionaries for educational purposes. We have a grammar by Robinson and T. J. Keith, and a dictionary by Keith, as well as a vocabulary by Ram Nath: Keith considers that the language has Aryan affinities, while Robinson compares it to Tibetan, and a connexion of the Garo with the Kachari on the other side of the valley is asserted, and is probable. They are Pagans, and surrounded on three sides by Hindu-settled districts; yet until very lately nothing was known of them.

Between them and the Asam valley is the tribe of Mikir, with a population of twenty-five thousand; a grammar of their language has been prepared by Robinson. They are a peaceable and settled people, though Pagans.

Such are the tribes surrounding the valley of Asam, and the exact position which each tribe bears to the Government of British India is not easily defined. Some are entirely subjects, and are good subjects: some are entirely independent, and most uncomfortable neighbours, but they are included in our political system as against the outer world: some pay revenue, some receive black-mail, some are Pagan savages, some civilized religionists of one of the known types.

We now return to the Naga Hills, and follow the mountain range which separates Burmah from British India. Just outside the boundary, but under treaty, is the kingdom of Muniपुरi. We have vocabularies of the Muniपुरi language by Mr. Hodgson and the Rev. Mr. Brown, and an English, Bengali and Muniपुरi dictionary. There is also a Muniपुरi grammar in the *Journal of the Bengal Asiatic Society*. The New Testament has been translated into Muniपुरi. They are a civilized people, and Hindus.

Proceeding southward we find in unsurveyed and impenetrable wilds, extending three hundred miles, the Kukis, one clan of which is well known from the late campaign, as the Lushais, and the more southern clan as Howlong and Sylu. Of their languages we have vocabularies by Captain Lewin and Major M'Culloch. In 1874, Captain Lewin published a valuable treatise: he explains that the people call themselves 'Dzos', that they have twelve tribes and dialects, but that the Lushai is the clan-language of all: that they never had a written character: that the main features of the language are agglutinative, as the root remains unchanged, suffixes being added, and the governed word precedes in the sentence the governing word. They are far from savages, though Pagan; they are civilized in the Asiatic sense, and exercise certain arts.

On reaching the hill districts of Chittagong we arrive very near the Bay of Bengal. These mountains are occupied by three classes. 1. The

Khyoungthi, who are Buddhists, fairly civilized immigrants from Arracan, speaking a dialect of the Aracan language : their written character is the same as Burmese, which is in fact a branch of the same stock : it has a strong affinity to the Tibetan group. 2. The Chukmas, of uncertain origin, who are Buddhists, merging into Hindus, at the same time that their Aracanese language is yielding to corrupt Bengali. In their language words can be traced which belong to neither. 3. The Toungtha, of mixed origin, if not the aboriginal inhabitants of the district, and more savage than the above-named. Among these are the Tiperahs, or Mrongs, Kumi, Mroos, Khyengs, who are subject to British India : Bungees, and Pankhos, who are partially, and Lushai-Kukis above-mentioned, Shendus or Lakheys, who are entirely independent. All are Pagans, and most are savages. There is a vocabulary of the Khyeng language by Major Fryer, and of New Kuki by Lieut. Stewart, both in the Journal of the Bengal Asiatic Society. There is a vocabulary of the Tiperah language, but no written character ; the same remark applies to the others. Little is known of the Shendu, but there is a vocabulary by Captain Tickell.

Proceeding southward we should enter British Burmah, from which for the present we abstain, and crossing the Bay of Bengal to land in Cuttack, we complete the circuit of the province of Bengal by enumerating the non-Aryan languages of Central India.

They consist of two great linguistic families, and are spoken by a population of not less than four millions, occupying a length of country of about four hundred miles from the District of Cuttack to Rajmahal, the boundary of Bengal and Behar. The two families are the Dravidian and Kolarian, and they are somewhat intermixed in their habitat, though perfectly distinct in appearance, customs, and language. Both lie outside of the Hindu and Aryan fold. Both are Pagan, and, if not savage in the sense of the Himalaic savages, yet fall short of the moderate type of Asiatic civilization : the language of both is agglutinating, and devoid of literature or of written character.

In the note in the report of last year a detail is given of the great Dravidian languages of Southern India, which are described as of Scythic origin, and connected with a pre-Aryan immigration from the West. Four tribes who spoke Dravidian languages are there mentioned as unimportant, two of whom will be noticed here. The Kota, a small Dravidian tribe in the Neilgherries, was incorrectly printed as Kole in last year's report : the two now to be noticed are the Gond, and Kandh, Khond, or Kho : two more are indicated as outlying members of the same family, the Uraon, and the Malers of Rajmahal. Thus we have four tribes in Central India whose language is Dravidian.

The Rev. Mr. Hurder has published a vocabulary of Rajmahali, and

Col. Ouseley, one of Uraon. Dr. Caldwell, in his *Comparative Grammar of the Dravidian languages*, has entered scientifically into the features of that family, which are well recognized. The Rev. Oscar Flex published in 1874 a good practical grammar of the Uraon language, and a considerable number of educational works have been published. A vast number of Aryan words have found their way into these languages, but the structure of the noun and verb has remained intact: when it is asserted, that the syntax has been assimilated to that of Hindi, we must pause, lest the argument should be turned round on the score of the well-known non-Aryan aspect of the Hindi sentence-method. Two of the Gospels have been translated into Gond. The Rev. Mr. Driberg published, in 1849, a very complete grammar and vocabulary of the Mahadeo dialect of the Gond, and Dr. Manger published an account of the dialect of the Seoni Gonds. The remarkable feature of the Gond is, that it has a system of verbal modifications and inflexions almost as elaborate as that of the Turkish, while the great Dravidian sister-languages of the south are very meagrely furnished. Dr. Caldwell imagines that this unexpected development is due to the influence of the highly-inflected Sonthali, its Kolarian neighbour, which will be noticed below. There exists a lucidly arranged grammar of the Khond, published in the Uriya character by Lingam Letchmajee, 1853: and Dr. Manger and Sir W. Elliot have published observations on these languages in 1847, in the *Journal of the Bengal Asiatic Society*. The Uraon and Rajmahali Maler contain a large admixture of roots and forms belonging to the Kolarian language. Mr. Hodgson considers the Uraon as a connecting link between the Kolarian family and the Rajmahali; and the Rajmahali as a connecting link between the Kolarian and Dravidian.

In the Kolarian family are many tribes under varying names, but which may be reduced to three great branches. 1. The Kols or Hos. 2. The Mundaris, or Mundas, or Bhumij. 3. The Sonthals. It is the generally received opinion, that the origin of this family is from the north-east, either from the farther side of the great linguistic watershed of the Himalaya, or down the funnel of the valley of the Burhamputer. Col. Dalton thinks that he can trace their progress through Asam into the Shan districts of Siam: the immigration from the north-west of the mighty Aryan race has severed this Central Indian family from its congeners. There is an asserted linguistic resemblance between the Mundari and the Mon of Pegu in British Burnmah—this is stoutly denied by others. Nothing is impossible, but

πολλὰ μετὰ

Οὐρέα τε σκίοντα, θάλασσά τε ἤχησσα.

A much more intimate knowledge of the structure of both languages is required to carry out such a connexion.

Capt. Haughton published vocabularies of some of the Kol dialects:

Capt. Tickell, in 1846, published a memorandum on the Holanguage. The Bible has been translated into Kol by the Rev. A. Nothrott. The Rev. J. Whitley, 1873, published a Mundari primer, and he asserts that any person familiar with this dialect will be understood by all Mundari-speaking people, and by the Lurka Kols. Hindi words have largely crept into use, and the struggle to retain this and the other non-Aryan idioms of a poor hilly tract may prove vain.

Two grammars have been published of the Sonthali language, one by the Rev. J. Philips in 1852, and a superior one by the Rev. L. Skrefsrud in 1873. Portions of the Bible have been translated into Sonthali. There are vocabularies of other dialects; but the learned missionaries, who have a Christian flock of thousands, assert that the same language is spoken by Sonthals, Munda-Bhumij, and others of the great Kol family, all the way from Orissa to the Rajmahal Hills. In grammatical structure, Sonthali is stated to be as superior to others as Sanskrit to its cognate languages. This bold assertion we are not in a position to test. But the second assertion, that the Sonthali is among the non-Aryan languages not even second to the Turkish in grammatical structure, is borne out by the artificial and complex, yet simple and transparent, symmetry of its verb-system; for it appears to possess voice, mood, tense, gender, number, person, case, forms, and conjugations, including five voices, five moods, and twenty-three tenses, three numbers, and four cases. And though the language is unwritten, the surprising fact is stated, that the Nagari alphabet of fifty letters represents the sounds, neither more nor less, with the single redundancy of *v*, and there exist common roots for very primitive ideas in Sanskrit and Sonthali.

It is not presumed that this sketch on a subject so obscure, extending over so vast an area, is exhaustive: no amount of precision can in the present state of our knowledge be obtained: the same tribes are called by different names, and different tribes included in the same nomenclature. It is asserted by some, that such well-known tribes as the Bhils have lost their language: by others that they still preserve it: what is preserved is attributed by some to the Kolarian, by others to the Dravidian family. In Kolhapur, under the Bombay Government, it is stated that certain dialects exist, and vocabularies are given: thus a question of degree is opened up: it may be that a language is wholly Aryan, but laden with non-Aryan vocables, the legacy of its extinct predecessor: when does a language end and a dialect begin? Another still more subtle point remains: it is admitted on all hands, that in the Sanskrit vernaculars there is a large residuum of non-Aryan words, and possibly we may have here tapped the common fount of the vocables of all the languages of India.

The work of the next quarter of a century is thus cut out, and consists in reducing to the form of practical grammars the leading and most

vivacious dialect of each group, marking the dialectal variations, and then drawing up a comparative grammar of each family. Pliny mentions that there were one hundred and thirty languages spoken in the Colehian market-place; the dialects of India outside the lordly Sanskrit vernaculars can be counted by scores. The savage Nagas are said to have thirty varieties of their own, as every stream or mountain ravine causes a corresponding dialectic fissure.

Vocabularies are not wanting, but we are getting beyond that stage of the inquiry. Dr. Hunter, in 1868, published one of a large number of non-Aryan languages: Col. Dalton has done the same in his *Ethnology of Bengal*: within the last year Dr. J. M. Coates has published a vocabulary of the dialects of Chota-Nagpore: Sir George Campbell, during the period of his being Lieut.-Governor of Bengal, collected and published specimens of the languages of India, with sentences of sufficient length to indicate structure of words and syntax: local vocabularies have been collected by other public servants, and notably by that illustrious linguist, Bryan Hodgson, the Resident of Nepal. In England, Latham in his *Elements of Comparative Philology* gives very brief sketches, and Max Müller, in his letter to Chevalier Bunsen, an appendix to *Philosophy of History*, treats the whole subject scientifically, and attempts classification; but his work is a quarter of a century behind date, and the author had no local knowledge. Numerous ethnical and political reports have been made on these tribes, which have been nearly a century in connexion with British India, but the chief feature of the annals of the border have been raids, and villages burnt in retaliation: our non-Aryan administration has been an unbroken failure. Within the last year Sir George Campbell collected and passed under personal review specimens of every tribe, and Col. Dalton has published photographs of nearly all.

Dr. Hunter, eight years ago, promised a comparative grammar, but the material collected is far from sufficient in quality and quantity for the construction of any sound principle of classification: many of the words entered in the vocabularies clearly are, and many more may prove to be, loan-words: the master mind is also still wanting, like the prince in the fable, to separate and group the confused heap of feathers.

And behind the linguistic question, which is the sole object of these remarks, lies the much greater one of race and religion; for the two hundred tribes, some of which we have noted, with perhaps six millions of population, are but the ethnical residuum *in situ* of the far larger portion, which has flowed down into the great crucible, and become fused into the lower strata of Hindu society all over India. There are two great fallacies which have to be dissipated—the first, that conquerors annihilate and destroy the races whom they invade and conquer: the second, that the Hindu religion is, and



ever has been, non-proselytizing. The whole history of India shows that the subject non-Aryan races were trodden down, utilized as helots, and admitted as an inferior caste into the Brahminical system: thus the subject races left their mark on the language of their conquerors; they lent words, and helped to modify syntax, but they lost their old language and identity, but preserved many of their customs and religious tenets under the veneer of a semi-Hinduism. Many tribes have retained their savage, or less civilized customs, and still lost their language, like the Bhils. Linguistically and ethnologically we have overlooked the vast residuum of non-Aryan races, and introduced little among them except a sale of fire-arms and spirits. It was a surprise that so large a proportion of the population of Lower Bengal were found in the last census to be Muhammadan: but these were non-Aryan immigrants from the eastern borders, who found Muhammadanism more to their mind, when they settled down to agriculture. Max Müller asserts broadly, that the majority of the speakers of Bengal are non-Aryan by race, and it will be our own fault, if the remainder do not find Christianity their best leader to civilization.

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The following additions have been made to the Library since the Meeting held in December last.

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No. 11. *M. L. Lamattine*.—Procédé pour reconnaître les vins colorés artificiellement.

———. Journal des Savants,—Août, 1876.

*MM. Barthelemy Saint-Hilaire*.—Inspection archéologique d l'Inde.

———. Revue Critique,—Nos. 37, 38, 39, 1876.

No. 39. *L'Avesta*, tr. p. de Harlez.

———. Revue des deux Mondes, Tome 17, Livraison 2, 3, 1876.

———. Revue Scientifique,—No. 28, Janvier, 1877.

### BOOKS PURCHASED.

BICKELL, GUSTAV. Kalilag und Damnag. Alte Syrische Uebersetzung des Indischen Fürstenspiegels, 4to. Leipzig, 1877.

GOEJE DE, M. J. Bibliotheca Geographorum Arabicorum. Pars tertia. Descriptio Imperii Moslemici Auctore Al-Mokaddasi. 8vo. Lugduni Batavorum, 1876.

MILLS, CHARLES D. B. The Indian Saint, or Buddha and Buddhism. A Sketch, Historical and Critical, 8vo., Northampton, Mass., 1876.

STUMM, HUGO. Der Russische Feldzug nach Khiwa. Historische und Militair-Statistische Übersicht des Russischen Operationsfeldes in Mittelasien. Royal 8vo. Berlin, 1875.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR FEBRUARY, 1877.

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The Annual Meeting of the Asiatic Society was held on Wednesday the 7th February, 1877, at 9 o'clock P. M.

COL. H. L. THUILLIER, C. S. I., Vice-President, in the Chair.

According to the Bye-Laws of the Society, the Chairman ordered the voting papers to be distributed for the election of Officers and Members of Council for 1877, and appointed Dr. Cayley and Mr. Waldie Scrutineers.

The CHAIRMAN then called upon the Secretary to read the Annual Report.

ANNUAL REPORT FOR 1876.

The Council of the Asiatic Society in submitting the Annual Report for 1876, have the satisfaction of exhibiting an unprecedentedly prosperous state of the Society's affairs. The year just passed has been one of the most eventful and important in the history of the Society, and it is to be hoped will mark a new era in its progress.

Under an agreement made with Government, the Council, on behalf of the Society, accepted the sum of Rs. 1,50,000 in lieu of the rooms originally assigned to the Society in the New Museum Building, and on completion of the negotiations, arrangements were made for the immediate removal of the Society's Collections to the New Museum. The Society's house is therefore now free from the Museum collections, and for the first time for many years the whole space is available for the more immediate purposes of the Society. This will enable the Council to assign proper space to the Library, and to make for the comfort of Members other arrangements that have hitherto been impossible. The house has been put in a state of thorough repair, and many improvements have been effected, and the Council feel assured that the arrangement under which the Society remains independent and in possession of their own building will be greatly to the

advantage of the Society, especially as they now possess one of the finest suites of rooms in Calcutta for their meetings, whilst the remaining space in the house is better adapted to the requirements of the Society, and the increasing stock of its publications, than the rooms in the New Museum ever could have been.

At the close of the year 1876, there were 347 Ordinary Members on the rolls of the Society, of whom 54 were in Europe. Of these Members in Europe 48 are non-subscribing Members, leaving a balance of 299 actual paying Members, of whom 119 are Resident, 175 non-Resident and 5 Life Members.

During the year under review, there has been an accession of 31 new Members, against 28 in the previous year, while the Society was deprived of 17 Ordinary Members by resignation, and 6 by death, making a loss of 23, and leaving a total number of Ordinary Members at the close of the year, 347 against 345 at the close of 1875.

The following is a tabular statement showing the fluctuations in the number of Members during the last ten years.

| Year. | Paying. |           |               | Absent.     | Total. |
|-------|---------|-----------|---------------|-------------|--------|
|       |         | Resident. | Non-Resident. | Non-paying. |        |
| 1867  | 307     | 154       | 153           | 109         | 416    |
| 1868  | 294     | 159       | 135           | 133         | 427    |
| 1869  | 304     | 162       | 142           | 138         | 442    |
| 1870  | 266     | 134       | 132           | 148         | 414    |
| 1871  | 286     | 112       | 174           | 160         | 446    |
| 1872  | 279     | 105       | 172+2 L.M.    | 159         | 438    |
| 1873  | 305     | 116       | 186+3 L.M.    | 53          | 358    |
| 1874  | 312     | 127       | 184+3 L.M.    | 32          | 346    |
| 1875  | 295     | 113       | 179+3 L.M.    | 50          | 345    |
| 1876  | 299     | 119       | 175+5 L.M.    | 48          | 347    |

Dr. Werner Siemens, Berlin, and Colonel Henry Yule, R. E., C. B. were in the past year elected Honorary Members.

Of the Ordinary Members the Council have to regret the decease of Mr. W. S. Atkinson, Dr. R. Brown, Captain J. Butler, Mr. W. L. Heeley, C. S., The Right Revd. Dr. R. Milman, Lord Bishop of Calcutta, and Mr. W. G. Willson. Captain Butler contributed several valuable papers to the Journal on the hill tribes of Eastern Asám and their languages; he died on the 7th January last from the effects of a spear-wound received while on political duty in the Nágá Hills. Mr. W. S. Atkinson was an accomplished entomologist, and had been for several years a Secretary of the Society, and a Society's Trustee of the Indian Museum. He died at Rome

on the 15th January. Mr. Heeley also had been for some time a Secretary of the Society and a Member of the Council and Philological Committee.

Of the Honorary Members—Prof. Jules Mohl, Memb. de l'Institut, Paris, and Prof. Christian Lassen, Bonn. A short account of the life and labours of Prof. Lassen, who had been an Honorary Member since 1831, was given in the June number of the Proceedings. Mr. Mohl, an oriental scholar of the highest reputation, was elected an Honorary Member in 1843, and was especially known for his critical edition of Firdausi's *Sháh-námah*, to which he devoted the last forty years of his life.

Of the corresponding members, Dr. M. Haug of Munich and M. F. H. Foucaux of Paris.

### Indian Museum.

The Council continue to carry out the provisions of Act XXII of 1876, Act XVII. of 1866 having been repealed, and to transfer all Natural History and Archæological specimens received by them to the Trustees of the Indian Museum. During 1876 the following specimens presented to the Society were transferred to the Museum.

1. Two pieces of Meteorite received from the Agra Archæological Society.

2. A collection of Archæological remains from Maldah.

3. A specimen of a Glass-sponge (*Hyalonema Sieboldii*).

The vacancies among the Trustees on the part of the Society, occasioned by the retirement of Dr. Oldham, Col. Hyde, Col. Gastrell, and Dr. S. B. Partridge, have been filled up by The Hon. Sir E. C. Bayley, K. C. S. I., Dr. T. R. Lewis, Captain J. Waterhouse, and Mr. H. Blochmann.

According to the provisions of the new Act, the number of Society's Trustees has been increased from four to five. A new Trustee will shortly be nominated.

### Finance.

The sum received from Government in lieu of the accommodation in the New Museum has ensured the permanent financial prosperity of the Society, by giving it a certain and assured income in addition to the subscriptions of Members. Under the new rules a large portion of this sum, *viz.*, Rs. 1,20,000 has been set aside as a Permanent Reserve Fund, which is to be increased yearly by the addition of the admission and compounding fees of Members. This Permanent Reserve Fund is not to be drawn upon except on very special occasions and with the full consent of the general body of Members. In course of time the income derived from this fund will enable the Society to take an active and prominent part in encouraging Oriental Studies, and stimulating the progress of research in



the Natural and Physical Sciences in this country : but before taking any definite steps in this direction, the Council consider it essential that this Permanent Reserve Fund shall be brought up to at least Rs. 1,50,000, so as to give the Society an income of not less than Rs. 6,000 per annum, independently of subscriptions. How far the Council will be able to do this at once will depend on the amount to be spent in repairs and fitting up the Society's Rooms.

As regards the present financial condition of the Society, the Council have the pleasure to report that the Assets of the Society at the close of 1876 consisted of :—

|                                  |     |          |    |   |
|----------------------------------|-----|----------|----|---|
| Government Securities, .....     | Rs. | 1,53,000 | 0  | 0 |
| Balance in Bank of Bengal, ..... | "   | 3,749    | 10 | 9 |
| Cash in hand, .....              | "   | 218      | 6  | 3 |

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Rs. 1,56,968 1 0

of which Rs. 1,53,000 are actually invested in Government Securities, Rs. 5,000 of Government paper having been sold to meet the expenses of the repairs of the house. A farther sum of Rs. 19,000 has yet to be paid on account of repairs, furniture, &c., but the Council fully expect that when all expenses have been paid connected with the repairs and refitting of the Society's rooms, there will remain the sum of Rs. 1,38,000 to the credit of the Society.

The total subscriptions realized from Members amounted during the year under review to Rs. 9,009, which is less by Rs. 751 than the total subscriptions collected during the previous year. The outstandings of the Society up to the 31st December 1876, amount to the large sum of Rs. 6,270. The arrears due to the Society at the end of 1875 were Rs. 6,561, upon which amount the slight reduction of Rs. 291 has been effected. The Council would urge upon Members the importance of punctual payment of their subscriptions. The expenditure on account of repairs, &c., during 1877 will be heavy ; and the early paying up of all arrears would render it to a great extent unnecessary to touch the vested capital of the Society.

The following is a statement of the receipts and disbursements of the Society during the year :

#### RECEIPTS.

1875.

|                            |     |       |    |   |
|----------------------------|-----|-------|----|---|
| Subscriptions, ... ..      | Rs. | 9,760 | 15 | 0 |
| Admission Fees, ... ..     | ... | 930   | 0  | 0 |
| Publications, ... ..       | ... | 1,729 | 10 | 0 |
| Library, ... ..            | ... | 411   | 14 | 0 |
| Secretary's Office, ... .. | ... | 24    | 15 | 6 |
| Vested Funds, ... ..       | ... | 449   | 0  | 0 |
| Building, ... ..           | ... | 4,800 | 0  | 0 |

|            |     |     |     |        |   |   |
|------------|-----|-----|-----|--------|---|---|
| Coin Fund, | ... | ... | Rs. | 0      | 0 | 0 |
| Sundries,  | ... | ... | ... | 3,657  | 0 | 1 |
|            |     |     | Rs. | 21,763 | 6 | 7 |

## 1876.

|                                |     |     |     |          |    |   |
|--------------------------------|-----|-----|-----|----------|----|---|
| Subscriptions,                 | ... | ... | Rs. | 9,009    | 1  | 9 |
| Admission Fees,                | ... | ... | ... | 800      | 0  | 0 |
| Publications,                  | ... | ... | ... | 1,535    | 8  | 0 |
| Library,                       | ... | ... | ... | 312      | 9  | 6 |
| Fines and Commissions,         | ... | ... | ... | 60       | 8  | 3 |
| Received from Government,      | ... | ... | ... | 1,50,000 | 0  | 0 |
| Interest on Vested Funds,      | ... | ... | ... | 13,675   | 14 | 8 |
| Rent from Government,          | ... | ... | ... | 1,920    | 0  | 0 |
| Postage and Miscellaneous,     | ... | ... | ... | 5,676    | 3  | 0 |
|                                |     |     | Rs. | 1,82,989 | 13 | 2 |
| Balance in the Bank of Bengal, | ... | ... | ... | 3,858    | 2  | 3 |
| Cash in hand,                  | ... | ... | ... | 160      | 9  | 4 |

Total, Rs. 1,87,008 8 9

## DISBURSEMENTS.

## 1875.

|                     |     |     |     |        |    |   |
|---------------------|-----|-----|-----|--------|----|---|
| Publications,       | ... | ... | Rs. | 7,373  | 2  | 1 |
| Library, ...        | ... | ... | ... | 4,475  | 6  | 6 |
| Secretary's Office, | ... | ... | ... | 3,769  | 9  | 9 |
| Vested Funds,       | ... | ... | ... | 4,073  | 9  | 8 |
| Building, ...       | ... | ... | ... | 1,008  | 12 | 7 |
| Coin Fund,          | ... | ... | ... | 376    | 4  | 0 |
| Sundries, ...       | ... | ... | ... | 3,686  | 3  | 8 |
|                     |     |     | Rs. | 24,763 | 0  | 3 |

## 1876.

|                                      |     |     |     |          |    |    |
|--------------------------------------|-----|-----|-----|----------|----|----|
| Publications,                        | ... | ... | Rs. | 8,893    | 14 | 6  |
| Library, ...                         | ... | ... | ... | 3,161    | 7  | 7  |
| Establishment and petty charges, ... | ... | ... | ... | 5,937    | 6  | 0  |
| Government Securities purchased, ... | ... | ... | ... | 1,44,800 | 0  | 0  |
| Premium and Commission,              | ... | ... | ... | 6,162    | 0  | 10 |
| Building Repairs, ...                | ... | ... | ... | 9,247    | 7  | 6  |

|                                       |     |          |    |   |
|---------------------------------------|-----|----------|----|---|
| Taxes, ... ..                         | Rs. | 792      | 0  | 0 |
| Coin Fund, ... ..                     | ... | 81       | 13 | 0 |
| Postage and Miscellaneous, ... ..     | ... | 3,964    | 6  | 4 |
| <hr/>                                 |     |          |    |   |
|                                       | Rs. | 1,83,040 | 7  | 9 |
| Balance in the Bank of Bengal, ... .. | ... | 3,749    | 10 | 9 |
| Cash in hand, ... ..                  | ... | 218      | 6  | 3 |
| <hr/>                                 |     |          |    |   |
| Total, Rs.                            |     | 1,87,008 | 8  | 9 |

The following is the estimate for Income and Expenditure for 1877.

#### INCOME.

|                                  |     |        |   |   |
|----------------------------------|-----|--------|---|---|
| Subscriptions, ... ..            | Rs. | 7,500  | 0 | 0 |
| Admission Fees, ... ..           | ... | 800    | 0 | 0 |
| Publications, ... ..             | ... | 1,500  | 0 | 0 |
| Library, ... ..                  | ... | 300    | 0 | 0 |
| Interest on Vested Funds, ... .. | ... | 8,000  | 0 | 0 |
| Postage, &c., refunded, ... ..   | ... | 4,000  | 0 | 0 |
| <hr/>                            |     |        |   |   |
|                                  | Rs. | 22,100 | 0 | 0 |

#### EXPENDITURE.

|                          |     |        |   |   |
|--------------------------|-----|--------|---|---|
| Publications, ... ..     | Rs. | 8,400  | 0 | 0 |
| Establishment, ... ..    | ... | 6,000  | 0 | 0 |
| Building Repairs, ... .. | ... | 0,000  | 0 | 0 |
| Coin Fund, ... ..        | ... | 500    | 0 | 0 |
| Library, ... ..          | ... | 2,000  | 0 | 0 |
| Postages, &c., ... ..    | ... | 4,000  | 0 | 0 |
| Taxes, ... ..            | ... | 800    | 0 | 0 |
| Balance, ... ..          | ... | 400    | 0 | 0 |
| <hr/>                    |     |        |   |   |
|                          | Rs. | 22,100 | 0 | 0 |

#### The London Agency.

The last statement of accounts received from Messrs. Trübner and Co. the Society's London Agents, dates from the 1st July, 1875 to the 30th June, 1876. A balance of £15-14-6 was found to be due to Messrs. Trübner, which was remitted on the 8th December, 1876.

Within the above-mentioned period the sale of the Society's Journal and Proceedings, as shown in the accounts submitted, realized Rs. 679-8,

and the publications of the Bib. Indica, Rs. 860-15, making a total of Rs. 1,540-7, which sum amounting, at an exchange of 1s. 8d. to the rupee to £128-7-4½, was placed to the credit of the Society.

During the same time the Society forwarded to Messrs. Trübner by different invoices, for sale, 218 copies of both parts of the Journal and 168 copies of the Proceedings, valued at £49-1; and of the Bib. Indica publications 439 copies worth £32.

The Invoices received from Messrs. Trübner, comprising the publications of scientific Societies presented to, and subscribed for, by the Society, books to order, and books on inspection amounted to £149-12-7. From this sum £12-4-6 has to be deducted, as it represents the value of books sent out on inspection, which were declined by the Library Committee and returned to Messrs. Trübner. The next statement of accounts will be received from the Agents about August, and will show the business transacted up to the end of June of 1877.

### Library.

During the year the additions to the Library comprised 1048 Vols. and parts of vols, of which 360 were obtained by purchase and 688 by presentation from the Government, from authors, and by exchange.

The Council regret that in consequence of the disorder caused by the removal of the Library for the repairs, it has not been possible to make any progress with the compilation of the new Catalogue. The Council however bear the subject closely in mind, and steps will be taken for immediately proceeding with this important work, as soon as circumstances will permit.

Arrangements will be made with the Society's London Agents and with local booksellers for the early supply of the latest standard works relating specially to India and the East, as well as for those of general scientific interest.

A furnished reading room has been provided for the use of members.

The Photographic Collection of the Society has only received two donations this year, consisting of a collection of photographs found among the effects of the late Dr. Stoliczka, and a set of photographs of the paintings at the Adjunta Caves in the Bombay Presidency, presented by the Government of India.

Five years ago the Council appointed a Pandit to prepare an ana-

| *Names.             | No. of MSS. | lytical catalogue of the Sanskrit MSS. in the Society's Library, and considerable progress has been made in the work. Upwards of eleven hundred codices have been analyzed and described in Sanskrit, as per memo on the margin.* A descrip- |
|---------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grammar, .....      | 85          |                                                                                                                                                                                                                                              |
| Dictionaries, ..... | 10          |                                                                                                                                                                                                                                              |
| Koshas, .....       | 30          |                                                                                                                                                                                                                                              |
| Tantras, .....      | 108         |                                                                                                                                                                                                                                              |
| Purānas, .....      | 115         |                                                                                                                                                                                                                                              |
| Medical Works,..... | 40          |                                                                                                                                                                                                                                              |
| Smṛiti, .....       | 185         |                                                                                                                                                                                                                                              |
| Jyotisha, .....     | 120         |                                                                                                                                                                                                                                              |

|                                            |     |                                        |
|--------------------------------------------|-----|----------------------------------------|
| Chhandus, .....                            | 6   | tive account in English of all the     |
| Alankasa, .....                            | 15  | MSS. on grammar has also been prin-    |
| Sāṅkhyā, .....                             | 10  | ted under the superintendence of Dr.   |
| Pātāṅgala, .....                           | 5   | Rājendralāla Mitrā, and a fascicu-     |
| Maimansā, .....                            | 35  | lus of about 180 pages will be pub-    |
| Nyāya, .....                               | 54  | lished in a short time. The other      |
| Rāmāyana, .....                            | 15  | portions await translation into Eng-   |
| Vedānta, .....                             | 72  | lish before they can be sent to press. |
| Kāvya, .....                               | 125 |                                        |
| Miscellaneous of recent Collections, ..... | 80  |                                        |
| MSS. 1110                                  |     |                                        |

During the past year the Pandit prepared notices of 173 MSS.

Dr. Rājendralāla Mitra has lately undertaken to prepare a catalogue *raisonné* of the collection of Buddhist MSS. from Nepal which Mr. B. H. Hodgson presented to the Society some years ago. The task is a difficult and extremely troublesome one, as it involves the necessity of reading a large mass of MSS., some of which are in the Gāthā dialect or corrupt Sanskrit, and written, for the most part, in the little-known Newāri character; but it is expected that with the aid of two Paṇḍits who are now working under him, Dr. Mitra, will be able, in course of the current year, to bring to light the contents of this rare and valuable collection.

Maulawī 'Abdul-Haī Kātib, under the superintendence of Mr. Blochmann, has begun to check the Arabic, Persian, and Urdū MSS., and prepare a new complete catalogue, which is urgently wanted.

#### Revised Rules.

During the year a revised edition of the Rules has been issued comprising several important additions, the principal of which are: the giving to the Council the power of electing Members during the Recess; the reduction of the Resident subscriptions from Rs. 12 to Rs. 9 per quarter, and the introduction of rules for the composition of subscriptions both by non-resident and resident Members. A rule for compounding subscriptions had long been required, but could not be introduced until the financial condition of the Society fully warranted it. The rules regarding the retention of Membership during absence from India and on leaving India permanently have also been remodelled, and the home subscription has been increased from Rs. 12 to Rs. 16 as it was found that the former rate was quite insufficient to meet the expenses incurred by the Society in supplying the Journal to absent Members with the cost of carriage to Europe. New rules have also been added regarding the disposal and custody of the Society's Funds. The Council have to acknowledge the assistance rendered in this matter by the Sub-Committee, comprising Messrs. W. T. Blanford, R. Taylor, J. O'Kinealy and the Secretaries.

#### Publications.

During 1876 the Society has issued 10 Numbers of the Proceedings, which together with the Meteorological Observations amount to 333 pages of letter press, illustrated by 3 plates.

Of the Journal, Pt. I, three Nos. have been issued containing 403 pages of letter-press with 7 plates. Of Journal Pt. II, 3 Nos. have been published consisting of 190 pages of letter-press illustrated by 14 plates.

The stock of the Society's publications, as also that of the *Bibliotheca Indica*, have been arranged on the ground-floor of the building.

#### Coin Cabinet.

The Coin Cabinet of the Society has, during 1876, acquired by presentations 4 gold, 3 silver, and 11 copper coins, and 6 silver coins by purchase. Of the gold coins the Society are indebted to Mr. Bourne for two, and to Dr. J. Scully for two. Of the silver and copper coins, Dr. Scully presented 3 silver and 9 copper, and Dr. Oldham 2 copper.

#### Repairs and Alterations.

As already reported to the Society, the Society's Rooms have been thoroughly repaired and several alterations and improvements effected.

The old Portico has been replaced by a new and more convenient one. The entrance into the house has been improved by the addition of a new door. A retiring room and a lavatory, have been fitted up on the ground floor. In lieu of the old wooden railing to the staircase, a new iron railing has been put up, and the staircase hall has been much improved by the enlargement of the skylight. The Meeting Room and other rooms round it have been coloured and ornamented, and the whole suite of public rooms, staircase, and approaches, have been lighted with gas.

In the Compound a new range of servants' houses has been built, and a handsome railing will be put up immediately along the Park Street front of the premises. That these alterations are a great improvement upon the old state of things there can be no doubt, and the Council have every reason to believe that they are regarded with satisfaction by the Members of the Society, who have seen them.

The amount spent up to 31st December, 1876 on account of repairs has been Rs. 9,200-0-0.

#### Pictures.

The collection of pictures in the possession of the Society has long been in a very bad state, and though a few of the worst were done up in 1874, the majority required a thorough cleaning. The whole collection has accordingly been placed in the hands of Mr. G. G. Palmer of the Surveyor General's Office to be cleaned and restored. Mr. Palmer has executed his task in a most satisfactory manner and has wonderfully improved the appearance of some of the pictures. The opportunity has also been taken of having all the frames repaired and re-gilt.

The expenditure on this account has been—

|                       |               |
|-----------------------|---------------|
| For the pictures, ... | Rs. 1,000 0 0 |
| „ frames, ...         | ... 1,561 5 6 |
|                       | <hr/>         |
|                       | Rs. 2,561 5 6 |
|                       | <hr/>         |

### Registration of the Society.

As it was considered desirable that the Society should have a definite legal status, it has been duly registered under the Literary Society's Act (XXI of 1860), and a rule has been introduced giving the Council power to take proceedings under the Act for the recovery of debts due to the Society, though it is hoped that the necessity will never arise for any such extreme measures.

### Secretary's Office.

Throughout the year 1876, the duties of Philological and Natural History Secretary, and the editing the respective Parts of the Journal have been discharged by Messrs. Blochmann and Wood-Mason. The General Secretaryship has been retained by Capt. Waterhouse. In June Col. Gastrell having resigned the Treasurership, consequent on his retirement from India, Mr. H. B. Medlicott, Superintendent, Geological Survey, took charge and, with the exception of the months of August, September, and October, during which time Capt. Waterhouse acted, has continued to perform the duties of that office.

The Council have reason to be satisfied with the zeal and energy shown by Mr. Leonard the Assistant Secretary during the year, and he promises, with more experience, to be a valuable servant of the Society. Babu Money Lal Bysack, who had served the Society for upwards of 24 years as Assistant Librarian, died in February last, and the Society have lost in him a faithful servant. Babu Judo Bindo Bysack, his son, has been engaged as Store-keeper and promises fairly. Babu Buddinath Bysack, the Cashier of the Society, having resigned in consequence of old age and increasing infirmities, his son Kedernath Bysack has been appointed in his place, and with occasional assistance from his father is carrying on the duties of his office.

### Bibliotheca Indica.

#### *Sanskrit Series.*

The editors of the Sanskrit Series continue their labours with unabated zeal, and considerable progress has been made in bringing the larger works of the Series towards completion. Altogether nineteen fasciculi have been published, comprising portions of seven different works.

The *Saṁhitās* of the Sama Veda owe their distinctive character to a

large mass of accents, prosodial marks, and musical notes, and the necessity of supplying those marks and notes above and below the lines of the text, as usual in old MSS., has entailed enormous labour, and greatly swelled the bulk of the work. The third volume, completed during the year, has brought up the work to the third book of the second part, and two volumes more, or about fifteen fasciculi, will bring the work to a completion. The MSS. used all belong to the North Indian recension, with prosodial marks differing in some respects from what are current in Southern India, but the principal peculiarity being the use of figures instead of letters to indicate the notes of the gamut it is not of much importance.

The fourth volume of the *Chaturvarga Chintāmani* is devoted to optional fasts and penances, which disclose an interesting picture of the state of Hindu society at the time when it was compiled, and for some time previously. The work, besides, is replete with quotations from ancient authors, which are of great value in connexion with the history of the canonical literature of the country. Seven fasciculi of the work have been printed, and six more will complete the volume.

Dr. Rājendralāla Mitrā has brought to conclusion his edition of the *Aitareya Aranyaka* of the Rig Veda with the commentary of Sāyaṇa Achārya. The work was undertaken at the suggestion of Professor Max Müller, and it has been completed with the aid of six MSS., one of which was obtained from Dr. Burnell of Mangalore, another from Dr. Bühler of Guzerat, and four from Benares. The texts from Madras and Bombay, it appears, do not differ at all from the North Indian recension. The editor has supplied an abstract, in English, of the contents of the work, and a full account of the materials which he had at command in carrying the work through the press.

Of Vāchaspati Miśra's Gloss on Śaṅkara's Commentary on the *Vedānta Sūtras*, two fasciculi have been published during the year under report. It is expected the work will be completed in course of the current year.

Owing to the want of reliable materials the progress of the Society's edition of the Commentary on the *Nītisāra* of Kāmandaki had been for some time very much impeded. The want, however, has lately been supplied. During a recent tour in the North Western Provinces in search of Sanskrit MSS., Dr. Rājendralāla Mitra procured a complete and very correct MS. of that work, and with its aid, the editor, Paṇḍit Jagamohana Tarkālankāra, will, it is expected, be able to complete the edition in course of the current year. Only one fasciculus of the work was printed during the past year.

Paṇḍit Chandrakānta Tarkālankāra continues his labours on the *Gṛihya Sūtras* of Gobhila. The commentary on it has been compiled by the Paṇḍit with the aid of two defective MSS. and the glosses on the



Snána, the Sandhyá and the Paríśiṣṭa Sūtras of which he possesses some excellent MSS. The work will prove of great value in explaining the domestic rites of the followers of the Sáma Veda.

The Society's edition of the Sañhitá of the Black Yajur Veda, which was originally undertaken by the late Dr. Roer, and subsequently taken in hand by Dr. Cowell, is now being carried through the press by Professor Maheśachandra Nyáyaratna of the Calcutta Sanskrit College. The work is of large extent, and it will take three or four years yet before it can be completed. Only one fasciculus was printed during the past year.

#### *Arabic and Persian Series.*

In the Arabic and Persian Series, eight fasciculi were issued during the year.

Of the *Iqábah*, or 'Biographical Dictionary of Persons that knew Muhammad', by Ibn Hajar, Maulawí 'Abdul Hai, Head-Professor of the Calcutta Madrasah, has issued Fasc. XIV and XV of Vol. II. A complete MS. of *Iqábah* was kindly lent to the Society by Nawáb Sayyid Siddiq Hasan Khán of Bhopál, and another MS. of the missing Vols. II and III was obtained from Maulawí Kabíruddín. Maulawí 'Abdul-Hai, in October last, went on a pilgrimage to Mecca, where he expects to examine the MS. of the *Iqábah* preserved there.

Major Raverty has issued two fasciculi, Nos. VII and VIII, of his annotated English Translation of the *Ṭabaqát-i-Náçirí*.

Mr. Blochmann has issued two 4to. fasciculi, Nos. XVIII and XIX, of the Persian text of the *Áin-i-Akbarí*. Not quite two fasciculi more will complete the work.

Maulawí 'Abd-urrahím of the Calcutta Madrasah has issued two 4to. fasciculi of Abul-Fazl's *Akbarnámah*, Vol. II.

The following is a detailed list of the publications during 1876—

#### *Sanskrit.*

CHATURVARGA CHINTÁMANI, by Hemádri, edited by Pañdit Bharata-chandra Śiromaṇi. Nos. 331, 341, 344, 354, Vol. II, Fasc. III to VI.

SÁMA VEDA SAÑHITÁ, with the commentary of Sáyaṇa Áchárya, edited by Pañdit Satyavata Sámasramí, No. 334, Vol. II, Fasc. VI. Nos. 339 340, 342, 347, 348, 351, 355, Vol. III, Fasc. I to VII.

ATTAREYA ARANYAKA of the RIG VEDA with the commentary of Sáyaṇa Áchárya, edited by Rájendralála Mitra. Nos. 335, 337, 345, Fasc. III to V.

BHÁMATÍ, a gloss on S'aṅkara Áchárya's commentary on the BRAHMA SÚTRAS, by Váschaspati Mísra, edited by Pañdit Bála Śástrí. Nos. 336, 343, Vol. I Fasc. II and III.

NÍTISÁRA, or the Elements of Polity, by Kámandaki with a commentary, edited by Jaganmohana Tarkálankára. No. 338, Fasc. IV.

GOBHILÍYA GRÍHYA SÚTRA, with a commentary by the editor, edited by Chandrakánta Tarkálankára. No. 346, Fasc. VI.

SAÑHITÁ OF THE BLACK YAJUR VEDA, edited by Dr. E. Roer, F. B. Cowell, M. A., and Maheśachandra Nyáyaratna. No. 236, O. S. Fasc. XXIX.

*Arabic and Persian.*

TABAQÁT-I-NÁSIRÍ of Minháj-i-Siráj, translated into English by Major H. G. Raverty. Nos. 331 and 333, Vol. I, Fasc. VII and VIII.

ÁÍN-I-AKBARÍ, by Abul-Fazl-i-Mubárák-i-'Allámí, edited by H. Blochmann, M. A., Nos. 349, 350, Vol. II, Fasc. XVIII, XIX.

THE AKBAERNÁMAH, by Abul-Fazl-i-Mubárák-i-'Allámí, edited by Maulawí 'Abd-urrahím. Nos. 352, 353, Vol. II, Fasc. I.

IQÁBAH, or BIOGRAPHICAL DICTIONARY OF PERSONS WHO KNEW MUHAMMAD, by Ibn Hajar, edited by Maulawí 'Abd-ul-Hai. Old Series, Nos. 234, 235, Vol. II, Fasc. XIV, XV.

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*List of Societies and Institutions with which Exchanges of Publications have been made during 1876.*

Agra :—Agra Asiatic Society.

Batavia :—Batavian Society of Arts and Sciences.

Belgium :—Geological Society of Belgium.

Birmingham :—Institution of Mechanical Engineers.

Bombay :—Branch Royal Asiatic Society.

„ :—Editor, Indian Antiquary.

Boston :—Natural History Society.

Bordeaux :—Bordeaux Academy.

Buenos Ayres :—Public Museum.

Brussels :—Royal Academy of Sciences.

Cherbourg :—National Society of Natural Science.

Calcutta :—Agricultural and Horticultural Society of India.

———— :—Geological Survey of India.

Christiania :—University.

Copenhagen :—Royal Society of Northern Antiquaries.

Cambridge :—University.

California :—California Academy of Arts and Sciences.

Dacca :—Editor, Bengal Times.

Dehra Dún :—Great Trigonometrical Survey.

Dublin :—Royal Irish Academy.

———— :—Natural History Society.

Edinburgh :—Royal Society.

- Frankfort :—Natural History Society.  
Geneva :—Physical and Natural History Society.  
Genoa :—Museum of Natural History.  
Königsberg :—Physical and Economical Institution.  
Lahore :—Agricultural Society of the Pánjab.  
Leipzig :—German Oriental Society.  
Liège :—Royal Society of Sciences.  
Leyden :—Royal Herbarium.  
Liverpool :—Literary and Philosophical Society.  
London :—Royal Society.  
—— :—British Museum.  
—— :—Royal Asiatic Society of Great Britain and Ireland.  
—— :—Royal Institution.  
—— :—London Institution of Civil Engineers.  
—— :—Royal Geographical Society.  
—— :—Museum of Practical Geology.  
—— :—Zoological Society.  
—— :—Statistical Society.  
—— :—Geological Society.  
—— :—Linnean Society.  
—— :—Anthropological Institute.  
—— :—Royal Astronomical Society.  
—— :—Editor, Athenæum.  
—— :—Editor, Geographical Magazine.  
—— :—Editor, Nature.  
Lyon :—Agricultural Society.  
Moscow :—Society of Naturalists.  
Madras :—Government Central Museum.  
—— :—Literary Society.  
Manchester :—Literary and Philosophical Society.  
Munich :—Royal Academy.  
Netherlands :—Royal Society.  
New Haven :—Connecticut Academy of Arts and Sciences.  
Oxford :—Bodleian Library.  
Paris :—Imperial Library.  
—— :—Anthropological Society.  
—— :—Asiatic Society.  
—— :—Geographical Society.  
—— :—Ethnological Society.  
Pisa :—Tuscan Society of Natural Sciences.  
Stettin :—Entomological Society.  
Stuttgart :—Natural History Society of Wurtemberg.

St. Petersburg :—Imperial Library.

———— :—Imperial Academy of Sciences.

Stockholm :—Royal Academy of Sciences.

Trieste :—Academy.

United States, America :—Geological Survey of the Territories.

Vienna :—Imperial Geological Institute.

———— :—Anthropological Society.

———— :—Zoological Society.

———— :—Imperial Academy of Sciences.

Washington :—Smithsonian Institution.

———— :—Commissioners of the Department of Agriculture.

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ABSTRACT OF PROCEEDINGS OF THE COUNCIL DURING 1876.

*January 25th. Special Meeting.*

A letter was read from the Hon. E. C. Bayley, C. S. I., regarding certain proposals of Government for the grant to the Society of Rs. 1,50,000 in lieu of the rooms assigned to the Society in the New Museum Building under the Museum Act, and for the repeal of the Act in question, except in so far as it provides for the representation of the Society on the Board of Trustees, the separate notation of the Society's collections and the ultimate reversion of the Society's collections to the Society in the case of the determining of the Trust.

The Council agreed that Mr. Bayley be requested to communicate with the Viceroy and express the general willingness of the Council to accept the proposals of the Government, subject to further knowledge of the proposed changes when definitely settled.

*January 27th. Ordinary Meeting.*

The Secretary reported that the Sub-Committee appointed by the Finance Committee to ascertain approximately the cost of establishment and of premises, that would be required for carrying out the object of the O. P. Fund in an efficient manner, recommend that the present charges for establishment should be continued, as the Secretaries were of opinion that the work could not be efficiently carried on otherwise.

The recommendation was approved.

Colonel Gastrell suggested the discontinuance of the publication of the Meteorological Observations of the Surveyor General's Office in the Proceedings as Mr. Blanford would publish them in his Meteorological Reports.

The decision of the question was postponed pending the publication of the returns by Mr. Blanford.

*February 7th. Special Meeting.*

At this Meeting the draft of the New Museum Act was taken into consideration and was approved by the Council on behalf of the Society so

far as the interests of the Society were concerned. The Council also expressed their willingness to accept the sum proposed to be paid in lieu of the accommodation in the New Museum Building provided for the Society under the old Act.

*February 24th. Ordinary Meeting.*

In reply to a letter from Messrs. Trübner and Co. regarding the selling price of the Society's Journal and Proceedings in England it was ordered that the cost in England of the Journal and Proceedings should be at 3s. and 9d. respectively, with the addition of the average cost of postage to England, viz. :—8d. for the Journal, 4d. for the Proceedings.

On the report of the Natural History Secretary on the extra Number 4, Part II of the Journal containing the late Mr. Blyth's Catalogues of Burmese Fauna, the Council passed a special vote of thanks to Mr. Grote, Lord Walden, Dr. J. Anderson and Dr. G. E. Dobson, for their labours in connection with this work.

*March 23rd. Special Meeting.*

On this occasion the whole of the Members of the Council present in Calcutta attended to consider the Draft Deed of Release to be signed by the Council on the receipt of the sum of Rs. 1,50,000 from the Government of India in lieu of the accommodation in the New Museum.

The Draft Deed was approved with certain exceptions which were afterwards altered by the Government Solicitor.

*March 30th. Ordinary Meeting.*

On this occasion also the Meeting was attended by all the Members of Council present in Calcutta, and the Deed of Release was finally approved and duly executed by the Council on behalf of the Society.

The Secretary reported that Rs. 1,50,000 had been received from Government and suggested that the whole sum should be invested at once, such sums as might be required for repairs could be sold out afterwards.

It was ordered that the Manager of the Bank of Bengal should be asked to purchase Government securities for the whole sum to the best advantage.

A letter was read from the Government of Bengal forwarding a letter, No. 405, dated 16th March, 1876, from the Government of India, Home Department, requesting that the Catalogues of Sanskrit MSS. discovered in Bengal might be submitted annually instead of quarterly.

Read the Minutes of the Council on a letter from the Secretary to the Zoological Garden Committee, asking for pecuniary assistance from the Society and suggesting that the President of the Society should be a Member of the General Council of the Gardens, or that the Society should have the right to nominate such a member.

It was ordered that the question be referred to the Finance Committee with a recommendation that Rs. 1,000 should be given to the Gardens, should the funds admit, irrespective of all questions of privileges to be accorded to the Society.

A proposal of the Secretary to employ extra clerks for indexing the records of the Society was sanctioned.

The recommendation of the Finance Committee that the pay of the Duftry Baber Ali should be increased to Rs. 12 per mensem was agreed to.

*April 27th. Ordinary Meeting.*

An exchange of the Society's publications with those of the United States Geological Survey was sanctioned.

Also with the Civic Museum of Natural History of Genoa.

On an application from the Assistant Secretary for payment from the Conservation of Sanskrit MSS. Fund for work done on account of the Fund, it was ordered that the Government should be applied to for sanction to the payment of Rs. 150 yearly to the Assistant Secretary on the above account.

A Sub-Committee was appointed to take the necessary steps for obtaining a Memorial of Dr. T. Oldham, late President of the Society.

Mr. F. Beaufort, C. S., having expressed his wish to withdraw from the Society on leaving India after 37 years' Membership, the Council agreed as a special case, in consideration of the unusually long time Mr. Beaufort had been a Member of the Society, to continue to send him the publications of the Society free of charge.

The recommendation of the Finance Committee that the consideration of the question of giving a donation of Rs. 1,000 to the Zoological Garden be deferred till it is known what the repairs of the Society's premises will cost, was approved, and the Secretary requested to inform the Honorary Secretary of the Zoological Garden Committee that the Council are unable to give a donation at present as great expense will have to be incurred for the repairs of the Society's premises.

Messrs. R. Taylor and J. O'Kinealy were appointed Members of the Sub-Committee on the Compounding Fee question in place of Messrs. Geoghegan and Schwendler who had left Calcutta.

On the recommendation of Mr. Blochmann it was ordered that the publications of the Society should be supplied to M. Schefer who had been appointed to fill the Chair of Oriental Literature in the University of Paris held by the late M. Jules Mohl, an Honorary Member of the Society.

*June 2nd. Ordinary Meeting.*

The offer of Mr. W. Macgregor to present the Society with 100 copies of his pamphlet on the Prevention of Accidents from Lightning was accepted with thanks.

Several changes in the rules being suggested, the question of a revised set of rules was referred to a Sub-Committee composed of

Mr. W. T. Blanford.

Mr. H. Blochmann.

Mr. J. O'Kinealy.

Mr. J. Wood-Mason.

Mr. R. Taylor.

Capt. J. Waterhouse.

Mr. Blochmann's request to be allowed to send Arabic MS. No. 444 to Dr. Goeje of Leyden for use in the preparation of the new edition of Tabari was sanctioned on the condition that it should be returned within six months after date of receipt.

The exchange of the Society's publications with those of the Frankfort Natural History Society was sanctioned.

### *30th June. Ordinary Meeting.*

Read a letter, No.       , dated       , from the Secretary to the Government of India, Home Department, requesting that the annual Catalogue of Sanskrit MSS., ordered in the Home Department Circular dated 10th March last, should in future be prepared for the calendar and not for the official year.

On the recommendation of the Finance Committee, the salary of Pandit Prem Chand Chaudari was increased from Rs. 30 to 40 per mensem, and that of Sibu, sweeper from Rs. 5-8 to 7 per mensem.

Mr. Blochmann's request to publish an extra number of the Journal Part I. containing extracts from the Survey and other Government reports was sanctioned.

### *July 4th. Special Meeting.*

The Council met to consider the Report of the Sub-Committee on the repairs required to the Society's House.

The report of the Committee was adopted with a few alterations, and it was agreed that the work should be entrusted to Messrs. Mackintosh Burn and Co. and put in hand at once.

The question of new godowns, shops and railing was deferred.

### *July 28th. Ordinary Meeting.*

A letter from Mr. R. S. Brough suggesting the omission of the word 'Troy' after 'grains' in the Meteorological Reports, published with the Society's Proceedings, was referred to the Surveyor General.

Read a letter, No.       , dated       , from the Secretary to the Government of India, Home Department, sanctioning, in reply to the Society's letter No. 274, dated 5th May, 1876, the transfer from the purchase to the establishment grant for the conservation of Sanskrit MSS. Fund of Rs. 150 to be paid yearly to the Assistant Secretary of the Society.

Read the minutes of the Council on the new estimates and plans furnished by Messrs. Mackintosh, Burn and Co. for the repairs and alterations of the Society's premises.

It was agreed that the whole of the interior alterations and new portico be sanctioned and that the question of the new railing, entrance gate, durwan's lodge, godowns and shops be referred to the Society at large.

*July 29th. Adjourned Meeting.*

The Finance Committee's recommendation that Babu Buddinath Bysack, Cashier, should be permitted to resign and that his son Kedarnath Bysack should be appointed in his place, the new arrangement being tried for six months before being made permanent, was sanctioned.

The suggestion of the Secretary that an exchange of publications with the Imperial Geographical Society of St. Petersburg should be sought, was agreed to.

The Natural History Secretary reported the following resolution of a Meeting of the Natural History Committee held on the 27th July :

"That the Council of the Asiatic Society be asked to address the Government on the subject of Deep Sea Dredging Operations, to point out that as the Dredging Committee, referred to in the letter from the Government of India, No. 225 dated 26th March, 1872, has not been appointed, the Council would recall to the memory of the Government the previous correspondence, urge that the vessel now being built for the Marine Surveys may be properly equipped and fitted for Deep Sea Dredging, and that advantage be taken of the return into store of the 'Challenger' equipment to apply for a portion of the sounding lines and apparatus and dredging gear.

The Natural History Secretary was ordered to draw up a letter for submission to Government.

*September 1st. Ordinary Meeting.*

Read a letter from the Surveyor General stating that in future the word 'Troy' would be omitted after 'Grains' in the tables of Meteorological Observations issued from his office.

Estimates were presented from Mr. G. G. Palmer for cleaning and restoring the pictures belonging to the Society, and from Mr. Garrick and Babu Nobin Chunder Dutt for regilding and repairing the frames. Captain Waterhouse and Dr. Waller were asked to make the best arrangement possible for the doing up of the pictures and frames.

A proposal of the Secretary that Dr. Oldham should receive the publications of the Society gratis in consideration of his services to the Society, was agreed to.



*November 3rd. Ordinary Meeting.*

An offer of Professor E. Cowell of Cambridge to publish a translation of the Sūtras of Sāṅdilya in the Bibliotheca Indica Series was accepted with thanks.

Mr. B. H. Hodgson having called the attention of the Council to the neglected state of the MSS. collected by him in Nepaul during 1824 and 1827, and suggested that a catalogue *raisonné* should be made of them, Dr. Rajendralala Mitra proposed the immediate employment of a pundit on Rs. 30 per mensem for the compilation of such a catalogue.

It was ordered that a grant of Rs. 300 should be made to Dr. Mitra for the cataloguing of these MSS., leaving all arrangements to him.

Read a letter from the Secretary to the Trustees of the Indian Museum forwarding a copy of an order of the Trustees to the effect that they agree to accept as correct the lists of the collections made over to them by the Asiatic Society as contained in the catalogues made in 1866 by Dr. Stoliczka and Mr. Ball.

It was ordered that the Trustees be informed that the Society agrees to accept the lists as proposed, and that they be asked to return the Society's copy of the lists duly signed by the Trustees.

*November 30th. Ordinary Meeting.*

Dr. Rajendralala Mitra's proposal that Professor Bála Sāstri should receive the Notices of Sanskrit MSS. in place of the late Pandit Rajaram, was sanctioned.

The Secretary was authorised to purchase furniture for the reading room and to proceed with the immediate erection of the new range of godowns.

*December 8th. Special Meeting.*

This meeting was held to consider Major Godwin-Austen's proposal that the Society should give a grant-in-aid to a Zoological Exploration of Tenasserim by Mr. Ossian Limbörg—the results of the exploration being published in the Society's Journal.

The Council ordered that a sum of Rs. 500, including the unexpended balance of the Rs. 800 granted to the Earth Current Committee, should be placed at the disposal of the promoters of the Tenasserim Zoological Exploration.

On the motion of the CHAIRMAN the Report was unanimously adopted.

COLONEL THUILLIER said—He hoped he might congratulate the Society on the state of its affairs as represented in the report the meeting had just heard read. It was highly satisfactory to find that the finances were in

such a flourishing condition, and that the arrangements with the Government in regard to the Imperial Museum had been brought to the conclusion represented, by which the Society now enjoyed the comfort and advantage of the greatly improved and renovated building they were at present occupying with a certain fixed income accruing from the funded property.

For this state of things the Society was doubtless indebted to the careful and watchful management of the Council and its office-bearers, which had been very conspicuous during the year under review.

To the Joint Secretaries, he considered they were specially indebted for the able and indefatigable manner in which the business of the Society had been carried out, as well as for the regularity of the appearance of the Journal and Proceedings. In the Philological Department, the report just read spoke volumes of the valuable labours of Mr. Blochmann. The Natural History section had been well cared for by Mr. Wood-Mason, whilst in the general department the energy and good management of Captain Waterhouse, especially in all the arrangements connected with the repairs and alterations of the premises entitled him to their special thanks. The good services of Captain Waterhouse to the Society were very marked. He therefore proposed that the cordial thanks of the Meeting be passed to the Secretaries and Treasurer for their continued useful and valuable services to the Society, which he had great satisfaction in bringing to their notice.

The motion was carried unanimously.

The Scrutineers reported the election of Officers and Members of Council for 1877 as follows :

The Hon. Sir E. C. Bayley, K. C. S. I.

*President.*

Dr. Rájendralála Mitra, Rái Bahádur.

Col. H. L. Thuillier, R. A., C. S. I.

W. T. Blanford, Esq.

} *Vice-Presidents.*

Capt. J. Waterhouse.

H. Blochmann, Esq., M. A.

J. Wood-Mason, Esq.

H. B. Medlicott, Esq.

} *Secretaries and Treasurer.*

The Hon. Sir E. C. Bayley, K. C. S. I.

Dr. Rájendralála Mitra, Rái Bahádur.

Col. H. L. Thuillier, R. A., C. S. I.

W. T. Blanford, Esq.

H. Blochmann, Esq., M. A.

Capt. J. Waterhouse.

J. Wood-Mason, Esq.

Dr. T. R. Lewis.

J. O'Kinealy, Esq., C. S.

} *Members of Council.*

Bábu Prannáth Pandit, M. A.

Dr. W. K. Waller.

Dr. D. B. Smith.

H. B. Medlicott, Esq.

T. S. Isaac, Esq.

Dr. J. Anderson.

} *Members of Council.*

The following gentlemen were elected to audit the Annual Accounts for 1876.

R. Taylor, Esq., C. S.\* and Major H. H. Godwin-Austen.

The meeting was then resolved into the Ordinary Monthly General Meeting.

Col. H. L. THUILLIER, C. S. I., Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From Dr. W. K. Waller, a copy of "Studies in Ancient History," comprising a reprint of "Primitive Marriage," by J. F. McLennan, LL. D.

2. From the Author, a copy of 'La langue et la littérature Hindoustanie en 1876', by M. Garcin du Tassy.

The following gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members—

Mr. William Crooke, C. S. ; Captain G. F. L. Marshall, P. H. D.

The following are candidates for ballot at the next Meeting—

Mr. Bazett Wetenhall Colvin, C. S., proposed by the Hon. Sir E. C. Bayley, K. C. S. I., seconded by Col. H. L. Thuillier, C. S. I.

Rev. A. G. Medlycott, proposed by Dr. E. W. Chambers, seconded by Mr. Alex. Wilson.

Mr. C. B. P. Gordon and Capt. T. Deane have intimated their desire to withdraw from the Society.

The CHAIRMAN announced to the Meeting that the New Museum Act had received the Viceroy's assent. The only point affecting the Society was the allotment of five, instead of four, Trustees to represent the interests of the Society.

\* As Mr. Taylor was unable to undertake the task of auditing the accounts Mr. Waldie kindly did so in his place.

The following is the Act :—

ACT NO. XXII OF 1876.

PASSED BY THE GOVERNOR GENERAL OF INDIA IN COUNCIL.

*(Received the assent of the Governor General on the 17th of  
December 1876.)*

An Act to provide for the management of the Public Museum at Calcutta.

WHEREAS, by Act No. XVII of 1866, reciting that it was expedient to provide for establishment of a Public Museum at Calcutta, to be called the Indian Museum, it was enacted that the Governor General in Council should cause to be erected at the expense of the Government of India a suitable building in Calcutta, to be devoted in part to collections illustrative of Indian Archæology and of the several branches of Natural History, in part to the preservation and exhibition of other objects of interest, whether historical, physical or economical, in part to the records and offices of the Geological Survey of India, and in part to the fit accommodation of the Asiatic Society of Bengal and to the reception of their library, manuscripts, maps, coins, busts, pictures, engravings and other property ; and it was also enacted that the Government of India should keep the said building in repair and pay and defray the salaries, allowances and pensions of the officers and servants, and all other expenses connected with the said Museum ; and by the Act now in recital certain officials and other persons therein mentioned or referred to, to the number of thirteen, and their successors, were constituted a Body Corporate by the name of the Trustees of the Indian Museum, and the said Trustees were empowered to receive bequests, donations and subscriptions, and to deal with the same in the manner therein mentioned for the purposes of their trusts therein mentioned ; and it was also enacted that the said Trustees should have the exclusive possession, occupation and control, for the purposes of such trusts, of the said building, other than those portions thereof which, upon its completion, should be set apart by the said Trustees for the records and offices of the said Geological Survey and for the accommodation of the said Asiatic Society and the reception of their library, manuscripts, maps, coins, busts, pictures, engravings and other property ; and it was also enacted that all officers and servants, salaried or otherwise, employed in the care or management of the trust-property, should be appointed, and might be removed or suspended, by the said Trustees, subject to such regulations and conditions as the said Trustees should think proper ; and it was also enacted that the Council of the said Asiatic Society should cause the collections belonging to such Society, and illustrative of Indian Archæology and the several branches of Natural History, and all additions that might be made thereto, to be removed to and deposited in the said building at the expense of the Government of India as soon as the same should be completed so far as to be

in a condition to receive the said collections, and that an inventory of the articles in such collections should be made by the said Society, one copy whereof was to be signed by the said Trustees and kept by the said Society, and another copy was to be signed by the said Society and kept by the said Trustees, and that the said Society should continue to have the same exclusive property in and control over their said library, manuscripts, maps, coins, busts, pictures and engravings which they then possessed, and that the Council of the said Society should have the exclusive possession, occupation and control, for the purposes of the said Society, of those portions of the said building which should be set apart for the accommodation of the said Society and the reception of their library and other property therein, before mentioned ;

And whereas the Government of India has caused the said building to be erected, and the Council of the said Society has caused the said collections belonging to the same Society to be removed to and deposited in the said building at the expense of the Government of India ; and an inventory of the articles in such collections has been made by the said Society, one copy whereof has been signed by the said Trustees and delivered to the said Society, and another copy has been signed by the Council of the said Society and delivered to the said Trustees ;

And whereas the said Trustees have, in pursuance of the said Act, set apart certain portions of the said building for the said records and offices of the Geological Survey of India ;

And whereas, in consideration of a sum of one hundred and fifty thousand rupees paid to them by the Government of India, the Council of the said Society has relinquished the exclusive possession, occupation and control secured to them by the said Act, of the portions of the said building which, under the said Act, were to be set apart for the accommodation of the said Society and the reception of their said Library and other property ;

And whereas it is expedient to alter the constitution of the said Body Corporate and to amend the law relating to the appointment and salaries of the said officers :

And whereas under the circumstances aforesaid it is expedient to repeal the said Act, and to re-enact it with the modifications hereinafter appearing ; It is hereby enacted as follows :—

*Preliminary.*

1. This Act may be called "The Indian Museum Act, 1876."
2. Act No. XVII of 1866 (*to provide for the establishment of a Public Museum at Calcutta*) shall be repealed. But all persons nominated under the said Act as Trustees of the Indian Museum, and all officers and servants appointed under the same Act and now holding office, shall be deemed to have been respectively nominated and appointed under this Act.

*Incorporation of the Trustees.*

3. The Trustees of the said Indian Museum shall be—  
such Secretary to the Government of India as the Governor General in Council from time to time directs in this behalf,  
the Accountant General,  
five other persons to be nominated by the Governor General of India in Council,  
the President of the Asiatic Society of Bengal and four other Members of the Council of the said Society for the time being, to be nominated by the Council of the said Society,  
the Superintendent of the Geological Survey of India, and  
three other persons to be elected by the Trustees for the time being and appointed under their common seal;  
and such Trustees and their successors shall, subject to the provisions hereinafter contained, be and are hereby constituted a Body Corporate by the name of the “Trustees of the Indian Museum,” and shall have a common seal, and by such name shall have perpetual succession; and all the powers of the said Corporation may be exercised so long and so often as there shall exist seven Members thereof.

4. The persons for the time being holding the offices respectively mentioned in section three shall be *ex officio* Members of the said Body Corporate, and shall cease to be such Members respectively upon ceasing to hold the said offices respectively :

Provided that, whenever the said Secretary to the Government of India, Accountant General or Superintendent of the Geological Survey of India is also the President of the said Society, the Council of the said Society may nominate any other person, being a Member of the said Society, to be a Trustee under this Act so long as such presidency is held by the said Secretary, Accountant General or Superintendent.

5. If any of the said Trustees for the time being dies or is absent from India for more than twelve consecutive months, or desires to be discharged, or refuses or becomes incapable to act, or not having been an *ex officio* Member of the said Body Corporate becomes such, or if any of the Trustees to be nominated by the Council of the said Society ceases to be a Member of such Council, then and in every such case the authority which appoints the Trustee so dying, being absent from India, desiring to be discharged, refusing or becoming incapable to act, or becoming an *ex officio* Member as aforesaid, or ceasing to be such Member of Council as aforesaid, may appoint a new Trustee in his place according to the provisions of section three,

and every Trustee so appointed shall thereupon become and be a Member of the said Body Corporate as fully and effectually as if he had been hereby constituted a Trustee.

*Powers of the Trustees.*

6. It shall be lawful for the said Trustees (a) to receive bequests, donations and subscriptions of land, buildings, money and any such objects of interest as aforesaid, and (b) to hold the same and to lay out such money for the maintenance, improvement and enlargement of the collections deposited in, presented to, or purchased for, the said Indian Museum, and otherwise for the purposes of the same Museum ;

and all such collections shall become the property of the said Trustees for the purposes of their trusts herein mentioned ;

and the said Trustees shall have the exclusive possession, occupation and control, for the purposes of such trusts, of the whole of the said building, other than those portions thereof which have been set apart by the said Trustees for the records and offices of the Geological Survey of India.

7. The said Trustees may from time to time make bye-laws consistent with this Act—

(a) for the management of the said Museum ;

(b) for the summoning, holding and adjournment of general and special meetings of the said Trustees ;

(c) for securing their attendance at such meetings ;

(d) for the provision and keeping of minute-books and account-books ;

(e) for the compiling of catalogues, and

(f) for all other purposes necessary for the execution of their trusts.

8. Subject to such regulations and conditions as the Trustees think fit, they shall appoint, and may remove or suspend, all officers and servants, salaried or otherwise, employed in the care or management of the trust-property : provided—

(a) that no officer be appointed without the approval of the Governor General in Council if such officer be, at the date of his appointment, in India, or without the approval of the Secretary of State for India in Council if such officer be not then in India ;

(b) that no new office be created, and no salaries of officers be altered, without the previous sanction of the Governor General in Council.

9. The said Trustees may from time to time order any duplicates of printed books, medals, coins, specimens of Natural History or other curiosities deposited in the Indian Museum to be exchanged for manuscripts, books or other objects of interest, or direct any such duplicates to be sold and the money to arise from such sale to be laid out in the purchase of manuscripts, books, maps, medals, coins, specimens of Natural History or other curiosities that may be proper for the said Museum.

10. At all meetings of the said Trustees three shall be a quorum for the transaction of business and for the exercise of any of the powers conferred upon them by this Act.

*Duties of the Trustees.*

11. The said Trustees shall furnish to the Government of India, on or before the first day of December in each year, a report of their several proceedings for the past twelve months, and further shall furnish, on or before the same day in each year, to such Auditor as the Governor General in Council appoints in this behalf, accounts of all moneys expended by the Trustees during the past twelve months, supported by the necessary vouchers.

The said Trustees shall cause such report and accounts to be annually published for general information.

12. The said Trustees shall cause every article in the said collections belonging to the Asiatic Society, and all additions that may hereafter be made thereto otherwise than by purchase under section six, to be marked and numbered, and (subject to the provisions contained in sections nine and fifteen) to be kept and preserved in the said Indian Museum with such marks and numbers; and an inventory of such additions shall be made by the said Society, one copy whereof shall be signed by the said Trustees and delivered to the said Society, and another copy shall be signed by the Council of the said Society and delivered to the said Trustees, and shall be kept by them along with the inventory already delivered to the said Trustees as aforesaid.

13. All objects taken in exchange under section nine for, and all moneys payable on sale under the same section of, any of such articles, shall be held on trusts and subject to powers and declarations corresponding as nearly as may be with the trusts, powers and declarations by this Act limited and declared concerning the same articles.

*Miscellaneous.*

14. All officers and servants appointed under this Act shall be considered public servants within the meaning of the Indian Penal Code; and so far as regards their salaries, allowances and pensions and their leave of absence from duty, they shall be subject to the rules for the time being applicable to uncovenanted civil servants of the Government of India.

15. In the event of the trust hereby constituted being determined, all collections then in the said Indian Museum, other than those next hereinafter mentioned, shall become the property of the Government of India, and the collections and additions mentioned in section twelve shall become the property of the said Society or their assigns.

The CHAIRMAN laid before the Meeting the following Circular received from the Royal Academy of Sciences of Turin regarding the establishment of the Bressa Prize, which would be of interest to the Members of the Society.

*THE BRESSA PRIZE.*

The last Will and Testament of CESARE ALESSANDRO BRESSA, Doctor in Medicine and Surgery, signed the 4th September, 1835, contains the following clause :

219930



"I leave all my property present and future, after paying certain legacies, to the Royal Academy of Sciences of Turin. The Academy may be represented by its Secretary, or by an attorney elected for that purpose by the resident members.

"On the decease of Signora Claudia Amata Dupéché, who has a life interest in all my possessions, the Royal Academy of Sciences of Turin will immediately enter in possession of everything, and may sell ground property, put capital out to interest, in any and whatever way it may find most profitable, and with the interest of this property a biennial prize is to be established, which will be adjudged in the following manner, *viz.* :—

"The net interest of the first two years to be given in premium to that person of whatever nation or country he be, who shall have, during the previous four years, made the most important discovery, or published the most valuable work on Natural and experimental Philosophy, Natural History, Mathematics, Chemistry, Physiology and Pathology, as well as Geography, History and Statistics.

"The net interest of the following two years to be given only to an Italian, who, by judgment of the above named Academy of Turin, shall have made the most important discovery, or have published the most important work, on any of the above mentioned sciences.

"The prize will continue to be distributed in the same order."

While fully aware of the great responsibility which rests on it, in being called to judge the productions of human intellect in a sphere so vast as to comprise nearly all the positive sciences, the Academy has accepted the task, with the intention of fulfilling to the utmost the generous wishes of the testator with regard to the promotion and advancement of Science.

The Bressa legacy remained free from all claims until the month of July 1876, consequently the first biennial term mentioned in the will, will include the years 1877—1878.

The first prize will be given in the year 1879 to that person, of whatever nation or country he be, who shall have, during the four previous years, made the most important and useful discovery, or published the most celebrated work, on any of the above-mentioned sciences.

The value of the first prize amounts to 12,000 Italian Lire.\*

In accordance with the spirit of Dr. Bressa's will, the Academy will choose the best work or discovery, whether, or not, it be presented by the Author.

The prize in no case will be given to any of the National members of the Academy of Turin, resident and non-resident.

In the year 1881 the second Bressa Prize will be given for the prece-

\* The Italian lira appears to vary in value from 7·8*d.* to 9·4*d.*—the above sum would therefore be between £370 and £490.—*Ed.*

ding quadriennial term 1877—1880, according to the above rules, except that in obedience to the testator's wishes it can only be conferred on an Italian.

And so on, every four years there will be a Bressa Prize for competition among scientific men of any part of the world, and every four years a Bressa Prize, which can be competed for by Italians only.

Turin, December 7th, 1876.

*The President of the R. Academy*

FEDERIGO SCLOPIS.

*The Secretary of the Class  
of Physical and Mathematical  
Sciences.*

ASCANIO SOBRERO.

*The Secretary of the Class  
of Moral, Historical and Philological  
Sciences.*

GASPERE GORRESIO.

Mr. WOOD-MASON exhibited a specimen of a Newt, which he had detected in a small collection of insects and other objects recently made by Colonel G. B. Mainwaring in the Darjiling hills and said:—"The specimen is in the highest degree interesting not only as being the first example of Tailed Amphibian that has ever been found in India, but also as being an individual of the remarkable species described by Dr. J. Anderson (P. Z. S. 1871, p. 423) from specimens obtained by him around the little Chinese town of Nantin and in various other parts of the same region. *Tylototriton verrucosus*, as the animal has been called by Dr. Anderson, lives, in Western China, in flooded rice-fields, but in Sikkim, according to Colonel Mainwaring, in damp situations amongst decaying leaves and sticks. There is, however, nothing remarkable in this difference of habit, for the common eft of Europe is not unfrequently to be found on dry land at some distance from water under logs of wood, there being no necessity for the Urodelous Amphibia, after they have passed through that stage of their existence during which they are provided with external gills for aquatic respiration, to keep to the water. The entire order of Tailed Amphibia is confined to the temperate parts of the northern hemisphere, but two species have already been described from countries the fauna of which is largely leavened by Indo-Malayan forms, *Cynops chinensis* having been recorded from near Ningpo and *Plethodon persimilis* from Siam. This occurrence of a newt within the limits of the Oriental region is far from being without a parallel in other groups of animals also; *Nectogale* (vide W. T. Blanford, P. A. S. B., 1876, p. ), *Anurosorex*, probably also *Crossopus*, and a host of animals, vertebrate and invertebrate, extending still further southwards, being only to be looked upon as stragglers from the Palearctic region, or as outposts of it, to use the happy phrase of Dr. Günther. The only other form of newt at all resembling *T. verrucosus*, in which horny matter accumulated at the points where the ends of the ribs project against the external integument forms on each side of the middle line of the body along the upper side of the flanks a conspicuous row of great

rough horny tubercles, is *Pleurodeles*, in which these bosses are sometimes so highly developed as to have given rise to the incorrect notion that the ends of the ribs projected free through the skin.

The following papers were read :—

- 1.—*Rough Notes on some Ancient Sculpturings on Rocks in Kamáon, similar to those found on Monoliths and Rocks in Europe.*—By H. RIVETT-CARNAC, C. S.

(Abstract.)

Mr. Rivett-Carnac describes the “cup-marks” observed by him on a rock about  $2\frac{1}{2}$  miles south of Dwárá-Háth, and 12 miles north of Ráníkhét in Kamáon, which resemble the cup-marks on the tumuli of Central India, noticed by him in the Proceedings for February, 1870, and those described by the late Sir James Simpson in his ‘Archaic Sculpturings’. Near the rock is a Mahádeo Temple, known as the ‘Chandeshwar Shrine’.

The cup-marks themselves are of two types, *first*, holes scooped out on the face of the rock, varying in size from 6 inches to  $1\frac{1}{2}$  in. in diameter ; *secondly*, ‘ringed cups’, each cup being surrounded by an incised ring. The latter marks, therefore, are but horizontal sections of the *lingam* placed on the *yoní*, and are thus ultimately connected with Mahádeo worship.

Though Sir J. Simpson summarily dismisses the theory of the cup-marks having reference to *lingam* worship, Mr. Rivett-Carnac adduces striking proofs of the correctness of this view, which is moreover confirmed by the sketches accompanying the paper.

Mr. Rivett-Carnac hopes to trace the rocks with their markings “from Madras through Central India and the Himálaya, and thus on through Central Asia to the Crimea and South Eastern Europe, and from thence to our own Islands. And if this is done, then there would seem to exist a sufficiently distinct tracing of the routes adopted by the tribe, one section of which went west, the other south, at a period of which there is but a faint historical record save on rough stones and temples with their markings of a type which are common to both Europe and India.”

The paper concludes with interesting references to this subject from Madras and home papers.

It will be printed in No. I, Pt. I, for 1877.

- 2.—*On the Final Stage in the Development of the Organs of Flight in the Homomorphic Insecta.* By J. WOOD-MASON.

(Abstract.)

“La dernière mue développe subitement les organes du vol dans toute leur étendue par une transformation vraiment merveilleuse et encore inexpliquée, car on ne comprend pas comment des organes aussi volumineux peuvent être renfermés dans les petites gaines où ils se forment pendant la période denymphé.” DE SAUSSURE, *Mission Scientifique au Mexique et dans l’Amérique Centrale, Recherches Zoologiques, VI<sup>e</sup> Partie, 1<sup>e</sup> Sect., Etudes sur les Orthoptères*, 1872, p. 224.

"When an insect quits the egg it has no wings nor the slightest rudiments of such, these making their first appearance at one of the earlier changes of skin as slight prolongations of the posterior angles of the dorsal arcs of the two hindermost divisions of the thorax, the mesothorax and the metathorax. These prolongations are so many duplicatures or flattened evolutions of the integument, the chitinous membrane that covers them above and below and on the edges being in direct continuity with that which covers the insect's body,—being, in fact, part of it,—and the intermediate cellular layer which produces this chitinous membrane being similarly continuous with that which underlies the skin of the rest of the insect's body. They increase in size slightly at each successive moult, soon acquiring a definite triangular form and the principal nervure dividing the wing into its two principal areæ; but relatively to the future wings they are small and insignificant even at the last moult, at which the organs of flight are suddenly developed to their fullest extent. If a wing-rudiment be examined just prior to a moult, it is found that its external chitinous covering has separated off so as to be easily detachable from a new wing-rudiment that has formed beneath it; and that the new wing-rudiment itself lies quite flat within its sheath, as the portion of the chitinous external layer which covers it may be called after its detachment. The new wing-rudiments are found to lie similarly flat within their sheaths at every change of skin down to and including the last but one, into the interval between which and the last it is that the growth of the wings from small and insignificant rudiments to their full extent is compressed. The penultimate change of skin accomplished, new wing-rudiments are produced in due course from the cellular layer, and, at the time when their sheaths first become detachable from them, they, like all their predecessors, lie extended quite flat within these sheaths; but the detachment of these is no sooner accomplished than they commence to grow with great rapidity. The first outward and visible signs of the growth that now ensues are the thickening of the prolongations (which up to this time were thin plates with thin and sharp edges closely embracing the insect's body, but which now gradually become biconvex masses with thick and blunt edges standing out from it) and the gradual obliteration of the principal nervure. The walls of the sheaths soon become distended to such a high degree of tenuity and consequent transparency under the enormous pressure put upon them from within by the rapidly growing wings, that it is possible to see, even without dissection, the manner in which these are forced to arrange themselves in so limited a space: it can be seen that the wings have thrown themselves into a multiplicity of closely-packed transverse folds representing increments of growth in length and that these again have disposed themselves, in groups, in wavy (longitudinal) folds representing growth in breadth; so that

the wings plaited and folded up in this complex manner present a superficial resemblance to the surface of a much convoluted brain or to a portion of a transverse section of a Labyrinthodont tooth. This mode of development of the wings obtains in all Orthopterous insects, upon larvæ of which these observations are mainly based; at least in some Neuroptera (*Termes*); and probably universally in the groups which Westwood long ago collectively termed the Homomorphic Insecta."

- 3.—*List of the Mollusca collected by Dr. J. Anderson, in Yunan and Upper Burmah, with descriptions of the new species.* By G. NEVILL, C. M. Z. S.

This paper will be printed in the Journal, Pt. II, No. 1, for the current year.

- 4.—*List of the Mollusca collected by the late Dr. Stoliczka when attached to the Embassy under Sir D. Forsyth in Yarkand and Ladak, with descriptions of the new species.* By G. NEVILL, C. M. Z. S.

This paper will be printed in Journal Part II, No. 1, for the current year.

- 5.—*On a case of Lightning; with an Evolution of the potential and quantity of the Discharge in Absolute Measure.*—By R. S. BROUGH.

The S. W. monsoon of 1871 may be considered to have been characterized in the neighbourhood of Calcutta no less by its copious and protracted rainfall than by the violence and frequency of its thunderstorms. During the progress of one of these storms in the early part of the monsoon, one of the trees standing near the gate of the compound of the building, then occupied by the Sadr Diwāni Adālat, and now used as the European Military Hospital, in Lower Circular Road, was struck by lightning. The branches of this tree overhung the wires of the Telegraph line, from which they were only about a foot distant. The discharge passed from the tree to the wires (of which there are four), broke fourteen double cup porcelain insulators, and passed to earth through the iron standards on which the wires are supported.

The one ends of all the four wires were connected to earth through instruments in the Calcutta Telegraph Office, at a distance of about  $5\frac{1}{2}$  miles from the locality of the accident. The other ends were connected as follows to earth through instruments: the first at the Telegraph Workshops, a distance of less than  $\frac{1}{4}$  mile; the second at the Lieutenant-Governor's residence, less than  $\frac{1}{2}$  mile; the third at Atchipur, less than 14 miles; and the fourth at Diamond Harbour, less than 25 miles. At the moment of the discharge nothing extraordinary was noticed at any of these offices.

It is often far too generally stated in text-books that lightning invariably follows the best conductor to earth. This statement is misleading at the best; and is absolutely untrue if the word "conductor" be employed in the sense to which it is usually restricted in electrical science. In this instance, for example, we find that the lightning broke 14 insulators, each having probably an electrical resistance of several thousand megohms, in preference to traversing a wire resistance of not more than 500 ohms to earth through the receiving instrument in the Telegraph workshops. The writers appear to overlook the fact (experimentally illustrated long ago by Faraday) that there is exerted a mechanical stress proportional to the square of the potential tending to produce disruptive discharge, as well as an electromotive force proportional to the simple potential tending to produce a conductive discharge. Thus the discharge may occur either along a path of minimum mechanical resistance or along a path of minimum electrical resistance. Which form of discharge will occur in any particular instance depends of course on the special circumstances of the case; but, generally speaking, as the potential increases the tendency naturally is (*cæt. par.*) for the disruptive to predominate over the conductive. In the case of lightning the potential is so great, that for any form of "lightning-protector" to be efficient, the conductive facilities offered must be correspondingly great, that is, the protector must offer no sensible resistance to earth, otherwise a disruptive discharge may take place from the protector itself, which under these circumstances becomes merely a source of danger.\* This tendency to disruptive discharge is taken advantage of to protect Telegraph instruments from lightning. An earth wire is brought very near to the line wire, from which it is insulated by only a very thin stratum of air: when the potential of the line wire rises abnormally, a disruptive discharge takes place at this point and the receiving instrument is thus saved.

I have twice lately seen it stated that Sir W. Thomson found that the resistance of air to disruptive discharge decreased as the thickness of the

\* It is very necessary therefore that all systems of lightning-protectors should be tested for resistance from time to time. Mr. Schwendler's method of quantitatively testing "earths" has already been described before the Society. (Journal A. S. of Bengal, Part II, Vol. XL, 1871). In this method two temporary auxiliary earths are required. Calling the resistance of the lightning discharger earth  $x$ , and that of the auxiliary earths respectively  $y$  and  $z$ , the three resistances  $x + y = a$ ,  $x + z = b$  and  $y + z = c$  are measured by any accurate method most convenient (*e. g.* Wheatstone's Bridge, Differential Galvanometer, Tangent or Sine Galvanometer, &c. or even an empirically calibrated galvanoscope) the mean of positive and negative readings being taken to eliminate any natural E. M. F. between the earths. From the results thus obtained the unknown resistance  $x$  can be calculated by the formula

$$x = \frac{a + b - c}{2}$$

stratum increased; and a French writer has referred the possibility of the occurrence of lightning discharges several kilometres in length to this cause. Sir W. Thomson's earlier experiments certainly shewed this unexpected result, probably due to the minute distances at which he was operating, but a later series of experiments, made at larger distances, shewed this result in a much less marked degree; and Sir W. Thomson himself says, "It seems most probable that at still greater distances the electromotive force will be found to be sensibly constant, as it was certainly expected to be at all distances\*."

Another assertion of the text-books is that the metallic rods now employed as lightning-protectors on buildings do not "attract" lightning. This statement is literally true, according to the meaning of the word "attract", but is untrue in effect. For such a rod-lightning-protector determines a line of maximum induction, and a discharge is more likely to occur at the place than if the protector were not there. Prof. Clerk Maxwell does not appear to hold this opinion; but it seems to me unquestionable that if a charged thunder-cloud, driving before the wind, is carried over a building furnished with a lofty metallic rod, discharge is more likely to occur than if the rod were away. In proof of this, I may refer to the case reported by Mr. Pidgeon in "*Nature*," and subsequently discussed before the Society of Telegraph Engineers (Proc. 12th May, 1875), in which the Flag-staff acted the part of an ordinary "lightning-protector."

Prof. Clerk Maxwell observed in his paper recently read before the British Association at Glasgow, that such lightning-protectors are designed rather to relieve the charged cloud than to protect the threatened building. In fact lightning-rods are legitimately employed for this very purpose in the vineyards, where the object in view is to relieve charged clouds and prevent disruptive discharges and the consequent showers of hail.

Under ordinary circumstances, however, the noise and light of the lightning flash must be regarded as a very harmless, if disagreeable, way of getting rid of some of the potential energy of electrical separation.

The protection of cities on the same principle, even if necessary or desirable would be too expensive and unsightly ever to be put in practice. But Faraday has proved that if our houses were made of metal, they would constantly remain at the potential of the earth, we should virtually be "under-ground," and live within them in perfect security. The iron churches occasionally employed in Europe fulfil this condition exactly. It is not of course usually practicable to live in metal houses, but we can live in almost equally effective metal cages formed by running conductors connected to earth along the summit, eaves, and corners of our houses†.

\* Papers on Electrostatics and Magnetism, p. 259.

† This portion of this paper was written before the meeting of the British Association at Glasgow.

The usual rod-protectors appear to be only suitable to such structures as themselves determine lines of maximum induction, *e. g.* church spires, factory chimnies, flagstuffs, &c.

The case of lightning referred to at the beginning of this paper is of peculiar interest because we know precisely the mechanical effect produced by the flash, and from this we can work back and estimate roughly the potential and quantity of the electrical discharge.

In the first place we can calculate the force required to burst the cylindrical portion of the porcelain insulator into which the iron stalk is cemented.

Let  $r$  = radius of the inside of the cylinder

$R$  = " " outside "

and  $F$  = the resistance to bursting

$$\text{Then,} \quad F = \frac{f R^2 - r^2}{R^2 + r^2}$$

where  $f = 66 \times 10^4$  grammes on the square centimetre.

Now the line wire was bound to the insulator by a thinner wire passing round it. The surface density could not have been uniform round the binding wire, but must have been greatest on the side touching the insulator.

By the method of electrical images in two dimensions it may be shewn that the surface density ( $\sigma$ ) on the inner side of the binding wire is approximately

$$\sigma = \frac{Q}{4 \pi^2 R \sqrt{d-a} (\sqrt{d+a} - \sqrt{d-a})}$$

where  $Q$  is the total charge on the binding wire,  $d$  the distance of the binding wire from the stalk of the insulator, and  $a$  the radius of the binding wire.

$$\text{But } 2 \pi \sigma^2 = F$$

$$\therefore \sigma = \sqrt{\frac{F}{2 \pi}}$$

Whence

$$Q = \sqrt{\frac{F}{2 \pi}} \cdot 4 \pi^2 R \sqrt{d-a} (\sqrt{d+a} - \sqrt{d-a})$$

which is the expression for the quantity of the charge on one insulator. As there were 14 insulators broken, this result must be multiplied by 14 in order to obtain the total quantity of the discharge.

Again the electrostatic capacity of the binding wire is

$$S = \frac{2 \pi R c}{\log \epsilon \frac{d + \sqrt{d^2 - a^2}}{d - \sqrt{d^2 - a^2}}}$$

where  $c = 1.9$  about.



But  $VS = Q$

$$\therefore V = \frac{Q}{S} = \sqrt{\frac{F}{2\pi}} \cdot \frac{2\pi}{c} \int \sqrt{d-a} \left( \sqrt{d+a} - \sqrt{d-a} \right) \\ \times \log \epsilon \frac{d + \sqrt{d^2 - a^2}}{d - \sqrt{d^2 - a^2}}$$

which is the expression for the potential of the discharge.

Now in the particular case under consideration

$$r = 1.500 \text{ c. m.}$$

$$R = 3.000 \text{ c. m.}$$

$$d = 2.250 \text{ c. m.}$$

$$\text{and } a = 0.125 \text{ c. m.}$$

$$\text{Hence } F = 396 \times 10^9 \text{ grammes per sq. centimetre.}$$

$$\left. \begin{array}{l} 14 Q = 50586.5 \\ V = 722.7 \end{array} \right\} \text{ absolute electrostatic C. G. S. units.}$$

Changing the units to the ordinary ones in practical use, we find

$$14 Q = 16.86 \text{ microfarads.}$$

$$V = 216810 \text{ volts.}$$

Assuming the sparking distance to increase as the square of the potential, it can be calculated from the experimental results obtained by Messrs. Warren de la Rue and Muller (Proc. Roy. Soc. Jan. 1876,) namely, that 1000-rod chloride of silver cells give a spark 0.009166 inch, that a difference of potentials of 216810 volts would produce a spark in air between two electrodes at a distance of about 36 feet apart. This is of course a relatively very short distance, but it must be remembered that we have only taken into consideration that portion of the energy of the discharge which was employed in breaking the 14 insulators, and have neglected all that was spent in heat, light, &c.

The reading of the following papers was postponed—

1.—*Note on the Variation of the Barometric Tides in connection with diurnal Land and Sea Breezes.* By HENRY F. BLANFORD.

2.—*The Kaimûr Range.* By CHANDRASEKHARA BÂNURJĪ.

The Meeting then adjourned.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in January last.

TRANSACTIONS, PROCEEDINGS, AND JOURNALS,  
presented by respective Societies or Editors.

- Birmingham. Institution of Mechanical Engineers,—Proceedings, Pts. I, and II, 1876.
- Königsberg. Physikalische—O'ekonomische Gesellschaft,—Schriften, Jahrgang 16, Abth. I, II, 1875.
- Leipzig. Deutsche Morgenländische Gesellschaft,—Abhandlungen, Band 6, No. 2.
- F. Stenaler*.—Indische Hausegelen. Párasara, Text.
- London. The Athenæum,—Nos. 2554 and 2568, 1877.
- . The Institute of Civil Engineers,—Minutes of Proceedings, Vol. 46, Pt. 4, 1875-76.
- . The Anthropological Institute,—Vol. 6, No. 2, October, 1876.
- Dr. Comrie*.—Anthropological Notes on New Guinea. *A. Taylor*.—On the Origin of Numerals. *H. Clarke*.—On Prehistoric Names of Weapons. *Dr. Lubach*.—On the Hunebedden or Cromlechs in the Province of Drenthe, in Holland.
- . Nature,—Vol. 15, No. 367, 1877.
- . Royal Astronomical Society,—Monthly Notices, Vol. 36, No. 9.
- . The Royal Society,—Proceedings, Vol. 25, No. 173.
- J. G. Jeffreys*.—Preliminary Report of the Biological Results of a Cruise in H. M. S. "Valorous" to Davis Strait in 1875. *W. B. Carpenter*.—Report on the Physical Investigations carried on by P. Herbert Carpenter, in H. M. S. "Valorous," during her Return Voyage from Disco Island in August, 1875.
- . The Statistical Society,—Journal, Vol. 39, Pt. 3.
- . The Zoological Society,—Proceedings, Pts. I, II, and III, 1876.
- Pt. I. *L. Taczanowski*.—Description d' un nouveau cerf tacheté du pays d' Ussuri méridional, *Cervus Dybowskii*.
- Pt. II. *A. Anderson*.—Corrections of, and Additions to, "Raptorial Birds of N. W. India."
- Pt. III. *Dr. Günther*.—Remarks on some Indian and more especially Bornean Mammals. *G. E. Dobson*.—On *Mystacina tuberculata*. *W. T. Blanford*.—Note on "Africa-Indien" of A. von Pelzeln, and on the Mammalian Fauna of Thibet. On some of the Specific Identification in Dr. Günther's Second Report on Collections of Indian Reptiles obtained by the British Museum. *Lieut. R. W. Ramsay*.—On an undescribed species of Nuthatch and another Bird from Karennie.

- London. The Zoological Society,—Transactions, Vol. 9, Pts. 8 and 9, 1876.  
 Pt. 8. *Prof. Owen*.—On the Osteology of the *Marsupialia*, Pt. 5.  
 Pt. 9. *O. Salvin*.—On the Avifauna of the Galapagos Archipelago.
- Munich. Königl. Bayerische Akademie der Wissenschaften,—Mathematisch-Physikalische Classe. Sitzungsberichte, Heft III, 1875, Heft I. 1876.  
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 No. 3. *H. Wild*.—Anémomètre muni d'un simple appareil pour la mesure de la force du vent. *O. Bothlingk*.—Notes pour servir à la critique et à l'explication de divers ouvrages Sanskrits.  
 No. 4. *K. E. v. Baer*.—La mer Caspienne mérite-t-elle le nom de glacière?  
*H. Wild*.—Recherches photométriques concernant la lumière diffuse du ciel.  
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K. KURODA, CHOKUWAN OF KAITAKUSHI, TOKAI, JAPAN.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR MARCH, 1877.

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The Monthly General Meeting of the Asiatic Society was held on Wednesday, the 7th inst., at 9 o'clock p. m.

The Hon. Sir E. C. Bayley, K. C. S. I., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the Government of Bombay—

The Book of Arda Viraf. By Dr. M. Haug and Dr. E. West, with a Glossary and Index.

Vendidad, translated into Guzeratí, by Kavasji Edabji Kanga.

2. From Commander A. Dundas Taylor, Superintendent Marine Survey Dept.—

A list of Light Houses and Light Vessels in British India, including the Red Sea and Coast of Arabia, corrected up to January 1877, by R. C. Carrington.

A Chart of the Madras Roadstead Survey, by Lieut. F. W. Jarrad, R. N. and Mr. P. J. Falle. October 1876.

3. From the authors, copies of the following—

"The Oriental Sore as observed in India;" and "Leprosy in India." By T. R. Lewis, M. B. and D. D. Cunningham, M. B.

4. From the Author, a copy of "The Rámáyana of Tulsi Das, Book 1, by F. S. Growse.

5. From the Rev. F. Foulkes, a copy of "Introduction to the Nannul; The Tamil text and the English Translation." By Rev. H. Bower.

6. From Mrs. Woodrow, copies of back numbers of the Journals of the Society from 1851 to 1873 and of the Proceedings from 1865 to 1875, belonging to her late husband.

The following gentlemen, duly proposed and seconded at the last Meeting, were elected Ordinary Members—



The Hon. Bazett Wetenhall Colvin, C. S.

The Rev. A. E. Medlicott.

The following are candidates for ballot at the next Meeting—

(1.) Rev. A. N. W. Spens, Chaplain, Bengal Establishment, proposed by Colonel A. D. Vanrenen, seconded by Major H. H. Godwin-Austen.

(2.) Irwine John Whitty, Esq., Supdt. of the Khurhurbari Collieries, Giridhi, E. I. R., proposed by Mr. H. B. Medlicott, seconded by Dr. O. Feistmantel.

The following gentlemen have intimated their desire to withdraw from the Society—

Messrs. A. J. Hughes, C. E. and F. C. Daukes, C. S.

The PRESIDENT reported that the Council had approved of the following modification of the proposed rule suggested by Mr. H. F. Blanford at the December meeting, and would recommend it in the usual way to the whole body of Members for adoption.

*“Before circulating any question coming under clause (c) of rule 64 for the votes of the general body of Members of the Society, the Council shall cause to be sent to every resident Member, at least 48 hours before the general meeting at which such question is to be proposed, a printed circular in which shall be set forth the nature of the proposal, and the reasons for it, in order that it may be duly discussed at such general meeting. A statement of any objections that may be raised at the meeting against the proposal, shall also be circulated with the voting papers.”*

The COUNCIL announced that they had appointed Mr. T. S. Isaac a Trustee of the Indian Museum on behalf of the Society, in accordance with the provisions of the new Museum Act which gives an additional Trustee on the part of the Society.

Also that the following gentlemen had been appointed to serve on the several Committees during the ensuing year.

#### Sub-Committee of Finance.

Dr. T. R. Lewis.

Dr. Rájendralála Mitra.

H. B. Medlicott, Esq.

Colonel J. F. Tennant, R. E.

#### Library.

Dr. Rájendralála Mitra.

A. Pedler, Esq.

Colonel J. F. Tennant, R. E.

Dr. Mohendralal Sircar.

G. Nevill, Esq.

C. J. Lyall, Esq.

Dr. D. D. Cunningham.

Dr. W. K. Waller.

Bábu Prannath Pundit, M. A.

C. H. Tawney, Esq., M. A.

W. S. Brough, Esq.

Whitley Stokes, Esq., C. S. I.

W. T. Blanford, Esq.  
 H. F. Blanford, Esq.  
 C. H. Wood, Esq.  
 Dr. O. Feistmantel.  
 John Elliott, Esq. M. A.  
 A. M. Nash, Esq.  
 Dr. J. Anderson.

Lieut. F. W. Jarrad, R. N.  
 H. H. Locke, Esq.  
 R. Parry, Esq.  
 Dr. T. R. Lewis.  
 H. Beverley, Esq., C. S.  
 J. Crawford, Esq., C. S.

#### Philology.

Dr. Rájendralála Mitra.  
 C. H. Tawney, Esq., M. A.  
 Major-General A. Cunningham,  
   C. S. I.  
 J. Beames, Esq.  
 F. S. Growse, Esq.  
 Rev. K. M. Banerjea, LL. D.  
 Bábu Gour Das Bysack.  
 Dr. Mohendralal Sircar.

Moulvie Abdul Latif Khán Bahá-  
   dur.  
 Moulvie Kabiruddin Ahmad Sahib.  
 Bábu Dvijendranath Thakúr.  
 Whitley Stokes, Esq., C. S. I.  
 Bábu Prannáth Pándit.  
 Dr. G. Thibaut.  
 C. J. Lyall, Esq.  
 Bábu Pratápa Chandra Ghosha.

#### Natural History.

G. Nevill, Esq.  
 H. F. Blanford.  
 V. Ball, Esq.  
 H. B. Medlicott, Esq.  
 Dr. O. Feistmantel.  
 D. Waldie, Esq.  
 A. O. Hume, Esq., C. B.  
 Dr. D. D. Cunningham.  
 Dr. J. Armstrong.  
 S. Kurz, Esq.  
 Dr. G. King.

S. E. Peal, Esq.  
 W. E. Brooks, Esq., C. E.  
 Dr. J. Scully.  
 Dr. W. Schlich.  
 Dr. T. R. Lewis.  
 R. Lydekker, Esq.  
 W. T. Blanford, Esq.  
 Major H. H. Godwin-Austen.  
 Capt. G. F. L. Marshall, R. E.  
 Dr. J. Anderson.  
 Lieut. F. W. Jarrad.

#### Physical Science.

Col. H. L. Thuillier, C. S. I.  
 H. B. Medlicott, Esq.  
 H. F. Blanford, Esq.  
 D. Waldie, Esq.  
 A. Pedler, Esq.  
 R. S. Brough, Esq.  
 Dr. D. D. Cunningham.  
 Dr. T. R. Lewis.  
 Major H. H. Godwin-Austen.  
 A. Cappel, Esq.

T. S. Isaac, Esq., C. E.  
 Col. J. F. Tennant, R. E.  
 Commander A. D. Taylor.  
 Dr. O. Feistmantel.  
 R. Lydekker, Esq.  
 V. Ball, Esq.  
 Col. D. G. Robinson, R. E.  
 Rev. F. Lafont.  
 J. O'Kinealy, Esq.  
 W. T. Blanford, Esq.

C. H. Wood, Esq.

A. M. Nash, Esq., M. A.

Dr. J. Scully.

W. D. Bruce, Esq., C. E.

J. Elliott, Esq., M. A.

## Coins.

The Hon. Sir E. C. Bayley,  
K. C. S. I.Major-General A. Cunningham,  
C. S. I.

Col. J. F. Tennant, R. E.

Col. F. W. Stubbs, R. A.

Dr. Rájendralála Mitra.

Rev. M. A. Sherring.

The PRESIDENT exhibited to the meeting the portrait of the late Dr. Stoliczka, which had just arrived from England, together with a copy of a photograph of it by the Woodbury process, of which a copy would be presented to every subscriber to the Fund, and read the following extract from a letter of Mr. A. Grote on the subject :

"I enclose you a photo. of Dickinson's portrait of Stoliczka, which is now in King & Co.'s hand for shipment to Calcutta. The print is I think fairly satisfactory, it is from a second negative taken from an unsuccessful print which I had touched up by an artist under Dickinson's supervision. The cost of the work therefore will be some £4 over the original estimate. Geflowski's second model for the bust seems to have been approved by Oldham, Hyde and Medlicott, and he is now proceeding with the work in marble."

The SECRETARY read an extract of a letter from Mr. W. H. Dall, of the United States Coast Survey, to his father, the Rev. C. H. Dall, M. A., announcing the death of Mr. F. B. Meek, the celebrated American Palæontologist.

Dr. FEISTMANTEL said—On the 21st December, 1876, died at Washington, Mr. F. B. Meek, the excellent Palæontologist of the United States Geological and Geographical Survey under the direction of Prof. Hayden. He published a great many important papers treating on the most various subjects of zoological palæontology, from almost all formations in different countries. These papers were published by him partly alone, partly in company with Mr. T. Hall, Mr. T. V. Hayden and lately with Mr. A. H. Worthen.

His palæontological papers are contained in different American Journals and Proceedings of Societies, but the most important are in the Survey papers, *viz.*, in the publication on the Geological Survey of California, Vol. I. 1867, on Carboniferous and Jurassic Fossils (with 8 Plates) ; in the papers on the Survey of Illinois, Vol. II, 1866, Description of Invertebrates from the Carboniferous System, by F. B. Meek and A. H. Worthen—(with many plates) ; Vol. III, 1868, Palæontology of Illinois, by Meek and Wor-

then. In the paper on the Geological Survey of Ohio, Vol. I, 1873, he described the Invertebrate Fossils of the Silurian and Devonian systems of Ohio, with 23 Plates, and, only a short time before his death, he completed his great work on Cretaceous and Tertiary Invertebrate Fossils of the Upper Missouri country in one large quarto volume. His death is certainly a great loss to American palæontology and to science altogether. These few notes would be sufficient to show his thorough knowledge of Zoological Palæontology in all its branches, but it was to be hoped that a more complete biography of Mr. Meek would be given hereafter.

The PRESIDENT announced that arrangements had been concluded for obtaining a memorial bust of Dr. Oldham by Mr. Geflowski.

The SECRETARY read an extract from a letter from the Vice-Presidents, Hofrath von Hauer, Director of the Imperial Geological Institute, and Hofrath Brunner von Wattenwyl, and Herr Döblhoff, Secretary, stating that they had established a Scientific Club at Vienna, (9, Eschenbach Gasse) and hoped that Members of the Asiatic Society would become guests or foreign members of the Club when they came to Vienna.

On the proposal of Mr. H. F. Blanford, seconded by Col. H. L. Thuillier, C. S. I., a vote of thanks to the Club for their kind and hospitable invitation was unanimously agreed to.

Dr. RÁJENDRALÁLA MITRA submitted to the inspection of the meeting a copper-plate grant sent to him for examination by Mr. E. T. Atkinson of Allahábád. It had been obtained from the Ráwal of Badrináth, resident at Pándukesvar through Sir Henry Ramsay. It measures 24 by 16 inches, and has a scalloped head on the left side, 5 inches high. In the middle of the head is let in a thick lead seal, 3 inches in diameter, about half an inch of its side standing above the surface of the plate, and projecting a quarter of an inch behind. The seal bears the figure of a bull couchant in bas-relief, and a legend in two lines of writing in relief. The inscription on the plate, extending to 29 lines, runs lengthwise from end to end, the last line being in several places detached, and the spaces filled up by ornamental scrolls, representing longitudinal halves of serrated leaves. The letters are of the Kuṭiḷa type, and the language is Sanskrit. (Plate I.)

The subject of the record is the gift of two wards (*palli*), one named Khásiyaka in the sub-division or village of Saurunnosá, and the other named Guggula in the subdivision or village of Pánibhuti, both situated in the district (*vishaya*) of Kártikeyapura, to a Bráhmaṇ named Páráyana Bhaṭṭáraka, for the worship of a goddess in the village of Saurunnosá. The grant was made on the day when the summer solstice began, on the 3rd

of the wane in the month of Māgha, Samvat 21st year of the king's reign. The record was composed by Ayata, the minister of war and peace, written out by the secretary or chief scribe Yijaka, and inscribed by one Gangabhadra. The donor was a king named Lalitasuradeva, son and successor of Ishtaganadeva, by Vegadevi, and grandson of Mimbara. The conveyancer is most lavish in his praise of the three kings, and has showered a large number of epithets in praise of them; but he affords no clue to the country over which the kings reigned. The date, though called Samvat, is obviously not intended for the era of Vikramāditya, as it is preceded by the epithet *pravardhamāna-vijya-rājya-samvatsara* which can only refer to the reigning sovereign. The character is unmistakably of the 10th century, and that is the date which can reasonably be assigned to the record. The legend on the seal repeats the geneology as given in the body of the record.

*Transcript of an inscription from Pāṇḍukeśvar near Baidyanāth.*

- (१) खल्लि श्रीमत्कार्त्तिकेयपुरात्सकलामरदितितनुजमनुजविभुभक्ति-  
भावभरभारानमितामितोत्तमाङ्गसङ्गिविकटमुकुटकिरीटविटङ्गको-  
टिकोटिश्लोकाता—
- (२) नाना(ताता)यकप्रदीपदीपदीधितिपानमदरक्तचरणकमलामलविपु-  
लबज्जलकिरणकेशरासारसारिताशेषविशेषमोघिघनतमस्तेजसस्व-  
धुनीधौतजटाजू—
- (३) टस्य भगवतो धूर्जटेः प्रसादान्निजभुजापार्जितौर्जित्यनिर्जितरिपु-  
तिमिरलब्धोदयप्रकाशदयादाक्षिण्यसत्यसत्त्वशीलशौचशौर्योदार्यगा-  
म्भोर्यमर्यादार्यदृष्टास्वर्थ—
- (४) कार्यवर्यादिगुणगणालंकृतशरीरः महासुकृतिसन्तानवीजावतारः क-  
तयुगागमभूपालललितकीर्त्तिः नन्दाभगवतीचरणकमलकमलासनस्थ-  
मूर्त्तिः श्रीमिम्बरस्तस्य त—
- (५) नयस्तत्पादानुध्यातो राज्ञी महादेवी श्रीनाश्रूदेवी तस्यामुत्पन्नः परम-  
माहेश्वरः परमब्रह्मण्यः शितकपाणधारेत्कृतमत्तेभकुम्भाकृष्टेत्कृष्ट-  
मुक्तावलीयशःपताका—
- (६) च्छायचन्द्रिकापद्मसिततारागण्यः परमभट्टारकमहाराजाधिराजपर-  
मेश्वरश्रीमदिष्टगणदेवस्तस्य पुत्रस्तत्पादानुध्यातो राज्ञी महादेवी  
ओवेगदेवी तस्यामुत्पन्नः परममा—

- (७) हेम्वरः परमब्रह्मण्यः कलिकलङ्कपङ्कतङ्कममधरण्यद्वारधारितधौरे-  
यवरवराहचरितः सहजमतिविभवविभुविभूतिस्थगितारातिचक्र-  
प्रतापदहनः । अतिवैभवसंहारारम्भसं—
- (८) मृतभीमभ्रुकुटिकुटिलकेसरिसटाभीतभीतारातीभकलभभरः अरु-  
णाखण्डपाणवाणगुणप्राणगणहठाकृष्टोत्कृष्टसलीलजयलक्ष्मीप्रथमस-  
मालिङ्गनावलो—
- (९) कनवल्ल्यसखेदसुरसुन्दरीविधूतकरस्वलक्ष्मणकुसुमप्रकरप्रकीर्णाव-  
तंससम्बर्द्धितकीर्तिबीजः पृथुरिव दीर्घगुणसाधितधनुर्भगुणबलावयु-  
म्भवश—
- (१०) वशीकृतगोपालनानिश्चलीकृतधराधरेन्द्रः परमभट्टारकमहाराजा-  
धिराजपरमेश्वरश्रीमल्लितशूरदेवकुशली अस्मिन्नेव श्रीमत्कार्तिके-  
यपरविषये समु—
- (११) पगतान् सर्वानवनियोगस्थान् राजराजतकराजपञ्चाख्यसामान्य-  
न्तमहासामन्तठकुरमहामनुष्यमहाकर्तृकतिकमहाप्रतीहारमहौद-  
खनायकमहाराजप्रमातारण—
- (१२) रभङ्गकुमारामात्योपरिकदुस्साध्यासाधनिकदशापराधिकचौरोद्धर-  
णिकशैल्लिकशैल्लिकतदायुक्तकविनियुक्तकपट्टाकापचारिकाशेषभ-  
ङ्गाधिकृतहस्त्यश्वेयु—
- (१३) बलव्याघ्रतकभूतप्रेषणिकदण्डिकदण्डपाणिकगमागमिशार्ङ्गिकाभितर-  
माणकराजस्थानीयविषयपतिभोगपतिनरपत्यश्वपति + खरक्षपति-  
शूरि—
- (१४) कस्थानाधिकृतवर्त्मपालकौटुपालघट्टपालक्षेत्रपालप्रान्तपालकिशोर-  
वरवागोमहिष्यधिकृतभट्टमहत्तमाभीरवणिकश्रेष्ठिपुरोगास्तछादश-  
प्रक्ष—
- (१५) त्वधिष्ठानीयान्खड्गकिरातद्रविडकलिङ्गशौरह्णोद्धुमेदान्त्रचाण्डाल-  
पर्यन्तान्सर्वसम्बासान्समस्तजनपदान्भटाचटसेवकादीनन्यांश्च कीर्त्ति-  
तानकीर्त्तितान्सम—
- (१६) त्यादपद्मोपजीविनः प्रतिवासिनश्च ब्राह्मणोत्तरान् यथाहं मत्तयति  
बोधयति समाज्ञापयत्यस्तु तेस्मादिदितमुपरिनिर्दिष्टविषये गौरव-  
सायां प्रतिबद्धखधियाक—

- (१७) परिभुज्यमानपत्निका तथा पणिभूतिकायां प्रतिबद्धगुणपरिभुज्य-  
मानपत्निकाद्वयं एते मया मातापित्रोरात्मनश्च पुण्ययशोभिद्वज्वे  
पवनविघटिता—
- (१८) श्रुत्यपत्रवचनतरङ्गजीवलोकमवलोक्य जलवुद्धाकारमसारं वायुर्दृ-  
ष्ट्वा गजकलभकर्णायचपलताञ्जलस्य त्वापरलोकनिःश्रेयसार्थसंसार-  
णवोत्तरणार्थञ्च
- (१९) पुण्येहनि उत्तरायणसङ्क्रान्तौ गन्धपुष्पधूपदीपोपलेपनैवेद्यवलिचरु-  
न्मद्यगेयवाद्यसत्त्वादिप्रवर्तनाय खण्डस्फुटितसंस्करणाय अभिनवक-  
र्मकरणा—
- (२०) य च भूतपदमूलभरणाय च गोरुन्नसायां महादेवीश्रीसामदेव्या  
स्वयंकारायितभगवते श्रीनारायणभट्टारकाय शासनदानेन प्रति-  
पादिताः प्रकृतिपरिहारयुक्ताः
- (२१) प्रचाटामठाप्रवेशः अकिञ्चित्प्राच्याः अनाच्छेद्य आचन्द्रार्काक्षितिस्थि-  
तिसमकालिकः विषयादुद्धृतपिण्डास्यसीमागोचरपर्यन्तस्य द्वा-  
भौः ऋदप्रखचणोपे—
- (२२) तदेवब्राह्मणभुक्तभुज्यमानवर्जिताः यतस्सुखं पारंपर्येण परिभुञ्जत-  
श्चास्योपरिनिर्दिष्टैरन्यतरैर्वा धरणविधारणपरिपन्थिजनादिकोप-  
द्रवो मनागपि न कर्त्त—
- (२३) यो नान्यथा - - महान्द्रोहः स्यादितिप्रवर्द्धमानविजयराज्यसम्बत्सर-  
एकविंशतिमे सम्बत् २१ माघवंदि ३ - - -महादानाक्षयपटलाधि-  
कृतश्रीपीजकः । लि—
- (२४) खिलमिदं महासन्धिविग्रहाक्षपटलाधिकृतश्रीमदायटाववनाटको-  
त्कीर्णा आगङ्गभद्रेण । बज्रभिर्वसुधा भुक्ता राजभिः सगरादिभिः ।  
यस्य यस्य यदा भूमिस्त—
- (२५) स्य तस्य तदा फलं । सर्वानेतान् भाविनः पार्थिवेन्द्रान् भूयो भूयो  
याचते रामभद्रः । सामान्योऽयं धर्मसेतुर्दृष्टपाणां कलिकालपाल-  
नोयो भवद्भिः । स्वदत्तां परदत्तां वा यो ह—
- (२६) रेत वसन्तरां । षष्टिर्गवसहस्राणि श्रविष्या जायते क्षमिः । भूमे-  
र्दाता याति लोके सुराणां हंसैर्युक्तं यानमारुह्य दिव्यं जौहे कुम्भे  
तैलपूर्णं सुतप्ते । भूमेर्ह—

- (२७) तौ पच्यते कालदूतैः । षष्टिवर्षसहस्राणि स्वर्गे तिष्ठति भूमिदः ।  
 आच्छेत्ता चानुमन्ता च तान्येव नरके वसेत् ॥ गामेकाच्च सुवर्णाच्च  
 भूमेरप्येकमङ्गुलं । हत्वा नरकमायाति यावदाह्नतिसंज्ञवं । यानीह  
 दत्तानि पुरा नरेन्द्रैर्दानानि धर्मार्थयशस्कराणि । निर्माल्यवन्ति  
 प्रतिसानि तानि को नाम साधुः पुनराददीत । — — —
- (२८) अममिदं समुदाहरद्विरन्यैश्च दानमिदमभ्यनुमोदनीयं लक्ष्मप्राप्तडि-  
 त्सलिलबुद्बुदचञ्चलायाः । दानं फलं परयशःपरिपालनञ्च ॥ इति  
 कमलदल—
- (२९) विन्दुलोलमिदमनुचिन्त्य मनुष्यजीवितञ्च । सकलमिदमुदाहृतञ्च  
 बुद्ध्या न हि परुषैः परकीर्तयो विबोधाः ॥

*Legend on the Seal.*

श्रीमिम्बरस्तत्पादानुध्यातः ।  
 श्रीमदिष्टगणदेवः तत्पादानुध्यातः ।  
 श्रीमल्ललितशूरदेवः क्षितीशः ।

The following papers were read :—

1. *Note on the Variation of the Barometric Tides in connection with diurnal Land and Sea Breezes.*—By HENRY F. BLANFORD.

(Abstract.)

Mr. H. F. Blanford said that one of the commonest and most familiar illustrations of convection currents, given in Manuals of Physics and Meteorology, is that of the diurnal land and sea breezes. During the morning hours the solar heat falling on the land, heats and expands the air resting on its surface to a much greater extent than that resting on the sea. Supposing then, that previously to this heating, the several strata were in equilibrium, the result must be, that the isobaric planes will be disturbed and made to incline towards the sea. At the ground surface this disturbance will be very small, but will increase with increased elevation. A further consequence will be that, above a certain level, a current of air will flow from over the land to the sea, raising the pressure over the latter, and, at the sea surface, raising it above the pressure on the land surface. A return current will be generated in the lower strata of the atmosphere, especially during the afternoon, and this constitutes the well known sea-breeze. At night, owing to the cooling and contraction of the air over the land, all these actions will be reversed. The isobaric planes will incline



towards the land, an upper current flow in the same direction and the pressure at the land surface being exalted by this access of air, over that at the sea-surface, a land wind will be produced blowing towards the sea. If then this theory be true we ought to find a greater pressure over the land in the early morning, over the sea in the afternoon. Hitherto, however, there had been no means of verifying this inference and so verifying the theory. This verification had lately been supplied by data furnished by the log books collected by the London Meteorological office, copies of which (relating to Indian Seas) had recently been made for the Indian Meteorological office, under the sanction of the Secretary of State, and with the permission of the Meteorological Committee of the Royal Society. The logs as yet received, related only to the month of January. On extracting from them the barometric observations made at intervals of 4 hours, between N. lat.  $20^{\circ}$  and the Sand Heads (lat.  $21^{\circ} 3'$ ), and taking the means of all those made at corresponding hours, the result showed with considerable accuracy the daily oscillation of pressure at an average distance of 70 miles from the land, since the observations were sufficiently numerous to eliminate all temporary irregularities of importance. When the curve representing the diurnal oscillation was computed from these data by Bessel's interpolation formula, and compared with that of Calcutta for the same month, it was found that the mean pressure of the two places being assumed to be equal, the pressure at the land station was in excess from 1 A. M. to 1 P. M. and that given by the ship observations in excess from 1 P. M. to 1 A. M., thus offering a very satisfactory verification of the theory just sketched out.

## 2. *The Kaimúr Range.*—By CHANDRA SEKHARA BANARJI.

(Abstract.)

The author describes the principal geographical and geological features of the Kaimúr Mountains. The range is called by the natives and in the Puránas 'Vindhya-mali' to which properly speaking it also belongs. Another name for it is *Kairo-mali*, 'the range of the Kaira-Des,' and it is probable that the word 'Kaimúr' is a corruption of 'Kairomali.'

The legend connected with the Karamnásá and Son rivers are given, and the paper concludes with a description of several shrines near Rohtás-garh. The author also gives two inscriptions, of Samvat 1173 and 1271.

The paper will be printed in No. 1, Pt. I, for 1877.

## 3. *Description of Ruticilla Shisticeps.*—By W. T. BLANFORD, ESQ., F. R. S.

This paper will appear in the Journal, Part II, with a coloured Plate.

4. *On Giants'-Kettles (pot holes), caused by water action in streams in the Rajmahal Hills and Barakur district.*—By DR. O. FEISTMANTEL.

(Abstract.)

Giants'-Kettles, or 'pot holes' as they are described in Handbooks on Geology and Physical Geography, are more or less regular cavities of various sizes in diameter and depth, excavated in all sorts of rocks. They were first described from Sweden, in 1769, and later from other localities; and various mythic stories were brought into connection with them in former times.

But while in most cases the Giants'-Kettles were shown to have been produced by running water, by cataracts in streams, &c., and to be of recent age only, yet for some others another time and cause was assigned, and they were found to have their origin in that post-tertiary time, which is termed the glacial period—and from this point of view they are certainly of geological interest.

As the author had observed the same forms in two different localities in Bengal, and as there is, so far as he knew, only one case from India recorded, he thought himself justified in describing those cases he had himself observed. They are a contribution to those forms which are produced in present times, apparently by running water in streams, and will certainly not be without interest especially for geologists in Europe, where similar forms are better known and thought worthy of description.

Last year he observed Giants'-Kettles in the Rajmahal Hills, in the Bansloi Nuddee, E. S. E. from the village Anrapura. In the Rajmahal district this river runs in a bed of trap-rock, which is often very hard, and in this rock also the pot holes are excavated.

At the time when he visited this place, there were two complete pot-holes in the river bed, with circular apertures and pretty deep; one was larger than the other, the diameter of its aperture being 96 c. m., the depth 120 c. m.; the other one measured 98 c. m. in diameter and 66 c. m. in depth. Both were polished inside and shewed circular ridges, which might indicate certain periods of excavation. In one of them there was water at the bottom, in the other one a heap of sand.

Close to these were two others, through which at that time water was flowing, having a distinct "affluent" and "effluent" channel, and producing a regular whirlpool in the cavity, in which sand and small pebbles were rolling round; there was no waterfall, the water flowing quite horizontally. They shewed the same conditions as the other ones only that they were not yet so deep, but clearly indicated the way in which the others also were produced. During the rainy season when the river is high, the force of the running water is much more rapid and larger pebbles are

driven in and rolled round—and this especially causes the excavation of the holes. The rock all round was more or less polished, showing various holes unfinished or just begun. The river-bed was very regularly longitudinally furrowed and polished, in the same way as is generally ascribed to ice action, but in this case undoubtedly, only by the force of the *running* water, in which sand and stones are carried down.

This year he had observed similar forms in the Bārākūr district, near Nirsha (6 miles west of Barākūr), in the Kudi-Nuddi. Here the sandstone of the coalstrata crops up in many thick ridges and immense blocks lie about, which from their polished surfaces and polished edges show, that they must have been carried there by the stream. It was in three of these blocks that he observed the Kettles. They were all complete, the dimensions were the following :

1. Aperture of diameter 60 c. m., depth about the same. 2. Dimensions almost the same. 3. The longer diameter 76 c. m., the shorter one 70 c. m., and the depth 85 c. m. The other conditions were the same as in those in the Rajmahal Hills.

In this locality also there is no doubt that running water, and not a cataract, caused the pot holes, and that the excavation is still in progress, especially in the rainy season.

In one of these pot holes in the Kudi-Nuddi there was a heap of sand and round pebbles, in another some water on the bottom.

There is therefore not the least doubt but that these forms are caused by running and whirling water only, without the aid of cataracts; and some phenomena, especially the polished surface of the rocks and the longitudinal furrows in the river bed in the Rajmahal Hills are not at all unlike those which are described as produced by glaciers, although this cause cannot be thought of at all.

Of the reported cases from other countries the most important are enumerated in the paper and the different ways of explanation are given.

Among these are the cases reported by Mr. Jackson from New-Hampshire; (1844), by Mr. Martins from the Chamoni valley (1844); by M. Collegno from South France, in the Tarn River (1844); by Mr. Helmersen from Finland (neighbourhood of the lake of Ladoga &c.) (1867); by Messrs. Böger and Reusch from near Christiania (1874) &c.

From India only one case is reported, as far as the author knew, by the Missionary Mr. Krick from the river bed of the Brahmaputra, near the Tibetan boundary (1857). Major Godwin-Austen, however, informed him that he has seen similar forms to these in the Naga-Hills, some of them very deep and narrow.

Mr. H. F. BLANFORD said that one of his earliest recollections as a student of Geology was precisely that explanation of the formation of pot

holes which Dr. Feistmantel had brought forward, and up to the present moment he had been unaware that any competent geologist had questioned its validity. The phenomena was indeed exceedingly common and its explanation generally obvious. The most striking circumstance connected with pot-holes was the great depth they occasionally attain to, with a very small diameter.

Dr. FEISTMANTEL said he doubted very much whether Mr. H. F. Blanford's statement, that these pot-holes are exceedingly common, is correct; otherwise they would have been more frequently noticed and described, and authors like Nordenskjöld, Jackson, Collegno, Kutorga, Helmersen, Böger and Reusch would not have devoted special papers to their description; and if they were so very common in India, some of the Officers of the Geological Survey, who visit different parts of India, would have observed them and we should find altogether more information about them—if, however, it was a fact that they are so common he would be very much obliged to Mr. H. F. Blanford if he could furnish him with more positive information about their occurrence, their size, &c., than is contained in the simple assertion "that they occur" which could be found in any Handbook of Geology, he did not, however, consider this general description sufficient, especially when he saw that the authors above named had devoted special monographs to these phenomena and taken the trouble to explain the different causes of formation, which they certainly would not have done if pot-holes had been so common, or always so apparent as Mr. Blanford seemed to think, and he would recommend these papers to Mr. Blanford's consideration.

As regards the occurrence of pot-holes in European streams, it is certain that they are not quite so common; Dr. Feistmantel had himself visited many streams but had seen no pot-holes and the few scattered communications about them would show that they are not so frequent, except only in certain regions.

The chief point Dr. Feistmantel intended to be shown in his paper, was that the polished surfaces of the rocks and the longitudinal furrows, were, in the cases noted, produced by water action and not by ice; and in the paper he also shows still another cause of polishing and scratching and gives some notes regarding a glacial time in the Talchir (Damuda) period.

To Mr. Blanford's questions whether there were any pot-holes explained by glacier action he would reply that he did not mean that they were produced by glacier action, but that the origin of some of them is put back so far as to the times of the glacial period—and this is indeed so, as shown in Messrs. Böger and Reusch's paper on *Giants'-Kettles* from near Christiania.\* The great Russian geologist, Mr. Helmersen, also speaks of

\* Quart. Journ. Geolog. Soc. 1874., p. 750, und Zeitschrift der Deut. Geol. Ges. 1874, p. 783, Pts. XXII—XXVIII.

some of the pot-holes described by him as produced during the diluvian period.\*

The explanation brought forward by Mr. Blanford, is the same as Dr. Feistmantel intended to show in his paper and he had never doubted it, but it is not, however, always so simple; and, as he had said distinctly, his observations were a contribution to those instances of pot-holes produced by running water. Another reason he had for describing the pot-holes was to show the other phenomena combined with them, especially the polished surfaces of rocks and longitudinal furrows in the river bed, which resemble so much those produced by glacier action, though they are here apparently produced by water only. Polished and scratched surfaces are not therefore always to be considered as necessarily produced by ice action.

He was much interested in this question and would be greatly obliged to any body who would give him positive information (measurements and, if possible, drawings) about the pot-holes in India.

Dr. RÁJENDRALÁLA MITRA remarked that the excavations shown on the plates laid on the table were very like what he had seen on the Ásvathámá rock at Dhauli near Cuttack, at Khandagiri and at Behar. Similar excavations had been noticed by antiquarians at Gírnár on the western coast, and in the neighbourhood of other ancient sites of Buddhist monasteries, and they had hitherto been believed to be artificial. Major Markham Kittoe took the Ásvathámá excavations for mortars in which the Buddhist monks, he thought, used to pound medicines for men and cattle. This opinion had been accepted by James Prinsep. Dr. Mitra could not make out from the drawings the size of the holes, but those he had seen were from one to two feet in diameter and eight to ten inches in depth.

Mr. H. F. BLANFORD observed that Dr. Rájendralála Mitra probably referred to something quite different from pot-holes.

The PRESIDENT remarked that he recollected a similar hole worn in an isolated boulder or block of granite lying in the bed of the Sutlej, near the Waughton bridge over that river in Kumaon. The block stood considerably above the present ordinary water level and probably formed part of a fall of rock which had at some former period fallen into the river and dammed the water to a higher level; this block was pierced by a hole reaching from the surface to near the bottom, and the impression on his mind at the time was that it had clearly been bored out by a pebble working in an eddy when the river was at a higher level. But it was many years since he had seen this block.

\* See Helmersen: *Das Vorkommen und die Entstehung der Riesenkessel in Finnland*; *Memoires de l'Acad. Imp. de St. Petersburg*, 1867, Vol. XI, Ser. 7., with 3 plates. Also Vogt, *Geologie*, Bd. II., p. 191.

5. *The Mythic History of the God Viráj.*—By G. S. LEONARD.

(Abstract.)

The divine personage of Viráj—self manifest, who forms one of the ten supernatural beings, and objects of adoration, in the scale of the creative agents, the Demiurgoi of the Vedanta and Platonic theories, is considered in the various lights of history, mythology, and theology, in all of which he makes a conspicuous figure in the Hindu scriptures.

Though the discordant and contradictory accounts given of his genesis, and of his historical and mythological traditions in the Purānas, make it extremely difficult to form a correct idea of his personality, he is, however, historically found to be the first male being in creation, and in that respect stands in the relationship of the progeny of Brahmá, the great creator of the universe and progenitor of Manu, and other patriarchs of mankind called by their patronymic Vairájás. He is mythologically identified with the Hindu Trinity composed of Brahmá, Vishnu, and Sivá, and sometimes of Ganesha also, of which some instances are adduced from the Sástras. He is theologically described as one of the manifestations of the hypostases or attributes of god inherent in nature, as its vivifying principle. He is further considered in a philosophical light as the automaton, the motive power or moving force of nature, and his poetical and mystical representation as the *ánima mundi* the mundane soul, and that of his consort Satarúpá (centiforma), as *corpus mundi* or body of the material world, is also shown, and identified with Múla-prakrit or primary matter, or plastic nature of Sāṅkhya philosophy and the goddess Sakh of mythology. Virájism is then vindicated against the charge of Pantheism, idolatry or any kind of material worship, and his religion is proved to be a purely mental one, and he himself is shown as an object of spiritual worship among all Bráhmans, as the God of Nature, apparent in the universal frame without any visible image or temple dedicated to him, except the human heart which alone is endowed with the power of receiving his infinite and glorious image and reflection.

The modification of Viráj into mahá and kshudra or major and minor forms, is also considered, in comparison with the theories of macrocosm and microcosm of European philosophers.

At the close of the meeting the PRESIDENT read the following extract of a letter from Mr. Grote and announced that the Council had agreed to accept Mr. Moore's kind offer and had asked Mr. Grote to be so good as to arrange for the publication of an extra part in London in the same manner as had been done with the Blyth Catalogues.

London, January 31st.

MY DEAR WATERHOUSE,—The question on which I told you last week that I should address your Society's Council concerns the publication of the novelties which have been found in our late friend Atkinson's Cabinet of *Lepidoptera*. The entire collection has gone to Germany, having been purchased by Standinger of Dresden, who has, however, left with Moore of the Indian Museum a selection of novelties among the Nocturnals, with a view to their being named and described. The comparatively few novelties among the Diurnals have fallen into Hewitson's hands and some of these have already been described in the Entomologist's Monthly Magazine for December.

Moore tells me that he finds some 650 species of Nocturnals for description thus:

|                   |     |
|-------------------|-----|
| Bombyces, .....   | 200 |
| Noctuæ, .....     | 200 |
| Geometridæ, ..... | 200 |
| Pyalidæ, .....    | 50  |

on the first of these groups he is already engaged, but it will take him some time to work out so many new species. The India Office catalogues having been for a time suspended he has asked me whether your Society would undertake to publish his descriptions as a memorial of your late Secretary. He estimates the cost of such a publication at about £142, which includes that of 8 plates uncoloured. Moore, who edited the Horsfield official catalogues and is well up in Indian entomology, offers his editorial labours gratis. I too offer my assistance in seeing the work through the press, and will endeavour to find materials for a short notice of Atkinson's scientific career and of his publications in the Zoological Society's Proceedings, to form an introduction such as I contributed to your Extra number for Blyth's Burmah catalogues. I have rather regretted that the labours of such a zealous collector of Indian *Lepidoptera* should appear to be overlooked by the Society which he so long served. Doubtless many of his discoveries would have been long ago made known through the Society's Journal if he had more leisure and fuller access to the figures of already described species. It is still open to the Council by accepting Moore's offer to secure for the Society and for Atkinson's Memorial the credit of first making his discoveries known to the entomological world.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in February, last.

## TRANSACTIONS, PROCEEDINGS, AND JOURNALS,

*presented by the respective Societies or Editors.*

Bombay. The Indian Antiquary,—Vol. VI, Pt. 65, 1877.

*Sir E. C. Bayley, K. C. S. I.*—Notes on Gupta Coins. *Dr. G. Bühler*—A new Grant of Govinda III., Râthor. *J. F. Fleet*.—Sanskrit and old Canarese Inscriptions, Nos. 17 and 18.

Calcutta. Geological Survey of India,—Memoirs, Vol. XIII, Pt. 2, 1877.

*Ball*.—Geology of the Rajmehal Hills.

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*W. T. Blanford*.—Geological Notes on the Great Indian Desert between Sind and Rájputana.

Copenhagen. Nordisk Oldkyndighed og Historie,—Aarboger, Pts. 1 to 4, 1875, and Pts. 1 and 2, 1876.

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*Dr. T. Inman*.—"On a Means employed for removing and erecting Menhirs. *A. Morgan*.—On the Khasi Hill Tribes of North-eastern Bengal, and on the Geology of the Shillong Plateau. *E. Nicholson*.—On Indian Snakes. *A. E. Nevins*.—On the Method of correcting the rate of a Marine Chronometer for changes of Temperature, according to Mr. Hartnup's laws, with Tables and Explanations for facilitating the Computations of the same Corrections."

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Dis. 1. *Mosso.*—Sopra un nuovo metodo per scrivere i movimenti dei vasi sanguigni nell'uomo. *Zucchetti.*—Memoria relativa alla scala delle velocità pel moto uniforme dell'acqua nei canali.

Dis. 4. *Salvadori.*—Intorno al tipo della *Goura Scheepmakeri*, Finsch, ed agli esemplari del genere *Goura* raccolti dal D'Albertis nella penisola orientale della Nuova Guinea, ed attribuiti alla medesima specie. Intorno alla identità Specifica del *Sericulus xanthogaster*, Schog. e del *Xanthomelus aureus*. Lin.

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GOVT. OF BENGAL.

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The Book of Arda Viraf with a Glossary and Index. By Dr. M. Haug and Dr. E. W. West.

GOVT. OF BOMBAY.

Sketch map of Dardistan and neighbouring countries.

GOVT. OF THE PUNJAB.

Report on the Administration of the Land Revenue Dept. of the Central Provinces for 1875-76.

CHIEF COMMISSIONER, CENTRAL PROVINCES.

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General Report on the Operations of the Revenue Surveys of India for 1875-76. By Colonel D. C. Vanrenen, R. A.

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General Report of the Operations of the Marine Survey of India from its commencement in 1874 to the end of the Official year 1875-76. By Commander A. Dundas Taylor.

List of Light-Houses and Light-Vessels in British India including the Red Sea and Coast of Arabia, corrected up to January 1877. By R. C. Carrington.

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THE REV. F. LAFONT.

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No. 108. *J. Wood-Mason*.—Description of a new Species of *Mantidæ* \* with Pointed Eyes. On a Species of *Iapyx*. On some remarkable Species of *Mantidæ*. *Rev. T. R. R. Stebbing*.—On some new and little-known Amphipodous Crustacea. *G. E. Dobson*.—Description of a new Species of *Vesperugo* from Zanzibar.

No. 109. *W. O. Hewitson*.—Descriptions of 25 new Species of *Hesperidæ*. *A. G. Butler*.—On *Rhopalocera* from Japan and Shanghai with descriptions of new Species. *J. Wood-Mason*.—Descriptions of new Species of *Blattidæ* belonging to the Genus *Panesthia*.

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———. The London, Edinburgh, and Dublin Philosophical Magazine,—Vol. 2, Nos. 13 and 14, and Vol. 3, No. 15.

No. 13. *G. Chrystal*.—On Bi- and Unilateral Galvanometer Deflection. *W. Aclroyd*.—Selective Absorption. *Lord Rayleigh*.—On the Resistance of Fluids.

No. 14. *A. M. Mayer*.—Researches in Acoustics, No. 8.

No. 15. *W. Spottiswoode*.—Description of a large Induction-Coil. *Lord Rayleigh*.—On a permanent Deflection of the Galvanometer-needle under the influence of a rapid series of equal and opposite induced Currents.

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No. 1263. *F. E. Thicke*.—Ventilation of Rooms generally, and the Way to make Workmen's Cottages comfortable, warm and healthy.

No. 1264. *A. Burrell*.—Indian Tea Cultivation, its Origin, Progress, and Prospects. Reports on the Government Chinchona Plantations in India.

No. 1265. *C. T. Kingzett*.—On some Processes of Nature's Hygiene leading to Improvements in the Production of Antiseptics, Disinfectants and Albumen of Commerce. *Prof. Barff*.—Zinc White as Paint and the Treatment of Iron for the prevention of Corrosion.

No. 1266. *J. Danvers*.—Indian Railways. *Sir J. Lubbock*.—Certain Relations between Plants and Insects.

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New Haven. The American Journal of Science and Arts,—Vol. 12, Nos. 71 and 72.

No. 71. *C. A. Young*.—Observations on the Displacement of lines in the Solar

Spectrum caused by the Sun's rotation. *A. M. Mayer*.—Researches in Acoustics. *O. C. Marsh*.—Notice of new Tertiary Mammals.

No. 72. *O. N. Rood*.—Experiments on the nature of the force involved in Crookes' Radiometer. *J. W. Dawson*.—On a Recent Discovery of Carboniferous Batrachians in Nova Scotia. *O. C. Marsh*.—Principal Characters of the American Pterodactyls.

Paris. Annales de Chimie et de Physique,—Tome 9, 5<sup>me</sup> Série, Octobre, Novembre, 1876.

Octobre. *M. Berthelot*.—Contributions pour servir à l'histoire des matières explosives. *M. F. M. Raoult*.—Influence de l'acide carbonique sur la respiration des animaux. *M. Cl. Bernard*.—Sur la formation du sucre dans le sang des animaux. *M. J. L. Smith*.—Recherches sur les composés de carbone que l'on rencontre dans les météorites.

Novembre. *M. le Dr. P. L. Panum*.—Le poison des matières putrides, les bactéries, l'intoxication putride et la septicémie.

Comptes Rendus,—Tome 83, Nos. 19 to 24; Tome 84, Nos. 4 to 6.

Tome 83, No. 20. *MM. E. Guignet et G. Ozorio de Almeida*.—Sur un fer météorique très-riche en nickel, trouvé dans la province de Santa-Catharina (Brésil.)

No. 21. *M. Berthelot*.—Nouvelles recherches sur les phénomènes chimiques produits par l'électricité de tension. *M. Fordos*.—Sur un procédé de recherche de la fuchsine dans les vins. *MM. P. Guyot et R. Bidaux*.—Note sur la recherche de l'acide rosolique en présence de la fuchsine. *MM. V. Feltz et E. Ritter*.—Nouvelles recherches sur l'action de la fuchsine non arsénicale, introduite dans l'estomac et dans le sang. *M. G. Hayem*.—Note sur l'action du fer dans l'anémie. *M. P. Picard*.—Recherches sur l'urée du sang.

No. 22. *F. A. Abel*.—Sur la composition du coton-poudre. *M. V. S. M. van der Willigen*.—De la force portative des aimants en fer à cheval. *M. Fordos*.—Deuxième Note sur la recherche de la fuchsine dans les vins. *M. A. Pierret*.—Recherches sur l'origine réelle des nerfs de sensibilité générale dans le bulle rachidien et la moelle épinière. *M. E. Duclaux*.—De l'action physiologique qu'exercent sur les graines de vers à soie, des températures inférieures à zéro. *M. J. Chatin*.—Sur la structure du bâtonnet optique chez les Crustacés. *M. E. Ferrière*.—Observation de trombes descendantes faite au cap d'Antibes, le 21 Novembre 1876.

No. 23. *M. P. Pichard*.—Productions de carbonate de soude par l'action du chlorure de sodium en dissolution sur les carbonates de chaux et de magnésie en présence de matières végétales. *M. Carbonniere*.—Mœurs des poissons le Gourami et son nid.

No. 24. *M. E. Faivre*.—Recherches sur la structure le mode de formation et quelques points relatifs aux fonctions des urnes chez le *Nepenthes distillatoria*. *M. A. Redier*.—Note sur la correction des variations de marche des pendules astronomiques, provenant des différences de pression atmosphérique. *M. P. Picard*.—Recherches sur l'urée du sang.

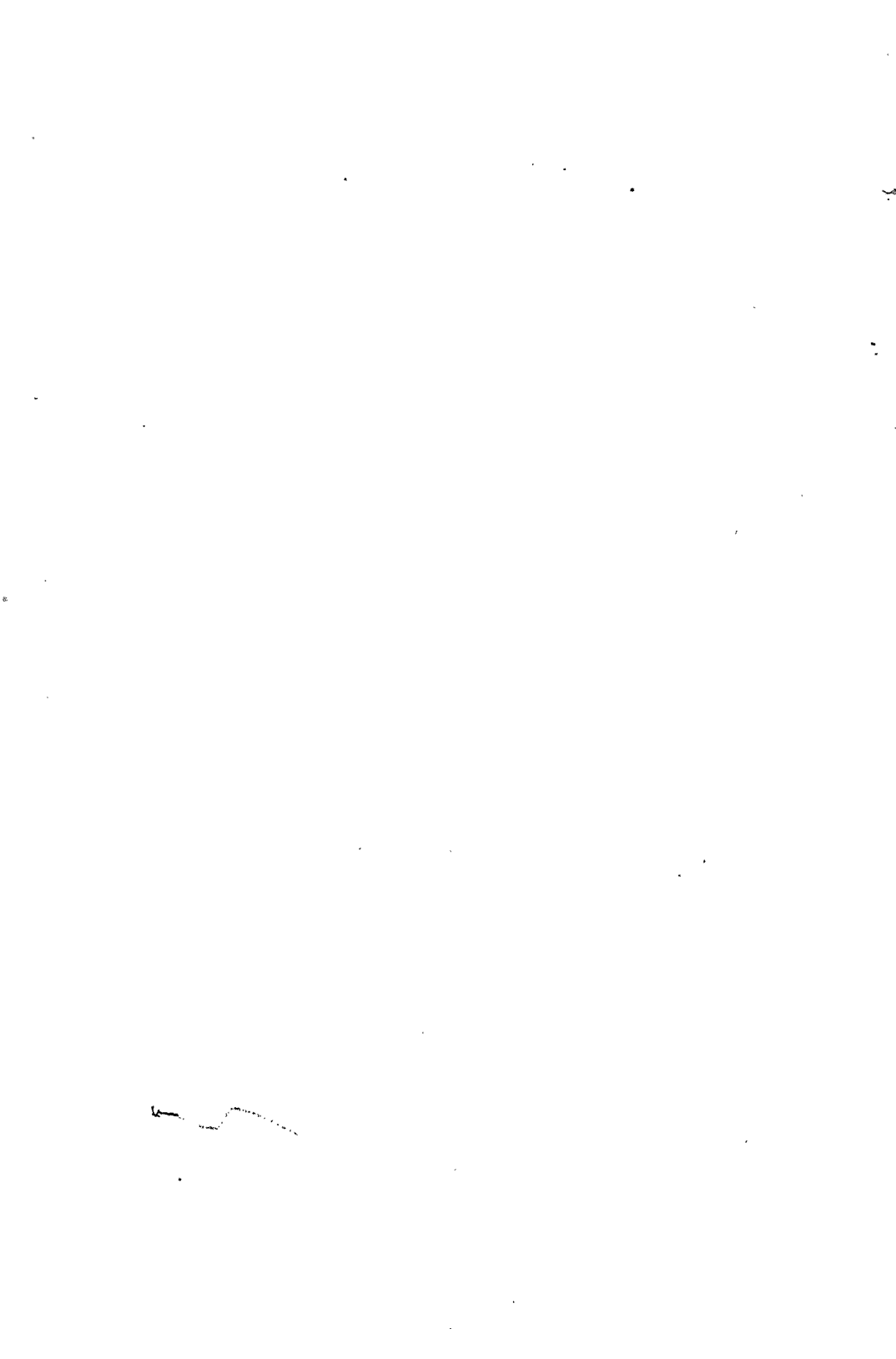
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- No. 5. *M. A. Rosal*.—Note sur la stabilité des voûtes. *MM. L. Pasteur et Joubert*.—Sur les germes des bactéries en suspension dans l'atmosphère et dans les eaux. *MM. E. Fremy et Clémentot*.—Recherches sur l'irisation du verre. *M. Jarriant*.—Sur une nouvelle disposition des tiges de paratonnerres. *M. Gaudin*.—Sur les effets produits par l'introduction de corps étranges au carbone, dans la préparation des charbons pour la lumière électrique.
- No. 6. *M. P. Regnard*.—Note sur la présence de l'ammoniaque libre dans l'acier fondu. *MM. V. Feltz et E. Ritter*.—Des accidents immédiats déterminés par les injections de fuchsine pure dans le sang. *M. Bayay*.—Sur l'anguillule intestinale (*Anguillula intestinalis*), nouveau vernématoïde trouvé par le Dr. Normand chez les malades atteints de diarrhée de Cochinchine, *MM. O. Galeb et P. Pourquier*.—Note sur *Filaria hamatica* (Hématozoaires). *M. Oustalet*.—Sur deux nouvelles espèces d'ibis, provenant du Cambodge.
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- No. 32. Conférence de M. le Commandant Cameron : Voyage à travers l'Afrique australe. *M. de Quatrefages*.—Les races humaines fossiles.
- No. 33. *M. A. Gautier*.—La Chimie des Plantes.
- No. 34. *M. J. Tyndall*.—La fermentation et ses rapports avec les phénomènes morbides.
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- BURNELL, A. C. The Sâma vidhânabrâhmaṇa (being the third Brâhmaṇa) of the Sâma Veda, Vol. 1, Text and Commentary with Introduction. 8vo., London, 1873.
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- HARLEZ, C. de. *Avesta, Livre Sacré des Sectateurs de Zoroastre. Tome II.* Royal 8vo., Paris, 1876.
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- GOULD, JOHN. *The Birds of New Guinea and the adjacent Papuan Islands, including any new Species that may be discovered in Australia.* Pts. 1 to 4, Folio, London, 1875.
- KAYE, J. W. *A History of the Sepoy War in India, 1857-58. Vol. 3.* 8vo., London, 1876.
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- LITTRÉ, E. *Dictionnaire de la Langue Française. Vols. 1—4.* Royal 4to., Paris, 1876.
- LIVINGSTONE, DAVID, DR. *The Last Journals of, in Central Africa from 1845 to his death. Continued by a narrative of his last moments and sufferings, obtained from his faithful servants Chuma and Susi, by H. Waller.* 2 Vols. 8vo., London, 1874.
- MARGARY, AUGUSTUS RAYMOND. *The Journey of, from Shanghai to Bhamò, and back to Manwyne. To which is added a concluding chapter by Sir Rutherford Alcock, K. C. B.* 8vo., London, 1876.
- PICKFORD, JOHN. *Mahá-Virá-Charita. The adventures of the Great Hero Ráma. An Indian Drama in Seven Acts. Translated into English prose from the Sanskrit of Bhavabhúti.* 8vo., London, 1871.
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- WILLIAMS, CLEMENT. *Through Burmah to Western China, being notes of a Journey in 1863, to establish the practicability of a trade-route between the Irawaddi and the Yang-tse-Kiang.* 8vo., London, 1868.



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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL.  
FOR APRIL, 1877.

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The Monthly General Meeting of the Asiatic Society was held on Wednesday, the 4th April, at 9 P. M.

DR. T. R. LEWIS in the Chair.

The Minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the author, a Historical and Statistical Memoir of the Ghazipur District, Pt. II. By Dr. W. Oldham, C. S.
2. From Capt. A. D. Taylor, Supdt. Marine Surveys, a Chart of Salang Island, (Junk Seylan) surveyed by Commander A. de Richelieu, H. M. Siamese Navy.
3. From Bábu Jogesh Chunder Dutt, twelve copper Coins, collected from Sarnáth, Banáras, and the Panjáb.

Mr. BLOCHMANN said that the copper coins presented by Bábu Jogesh Chunder Dutt did not require particular notice. The oldest was a Bactrian copper coin, and the most recent a pice struck by one of the kings of Audh.

The following gentlemen duly proposed and seconded at the last Meeting were balloted for and elected ordinary Members—

I. J. Whitty, Esq.

The Rev. A. N. W. Spens.

The following are candidates for ballot at the next Meeting—

1. Mr. J. A. Bourdillon, C. S., Offg. Asst. Secretary to the Government of Bengal, proposed by Mr. C. J. Lyall, seconded by Mr. J. O'Kinealy.
2. Mr. W. Sandford, Head Asst. Office Chief Engineer, P. N. S. Railway, Lahore, proposed by Mr. M. Macauliffe, seconded by Mr. J. Gouldsbury.

The Hon. T. E. Ravenshaw, C. S., proposed by Colonel H. L. Thuillier, C. S. I., seconded by Capt. J. Waterhouse.

The following gentlemen have intimated their desire to withdraw from the Society—

Colonel H. Drummond, R. E.

Major Lord Ralph Kerr.

Mr. G. Nevill, (on leaving India).

Bábu Bhagabati Churn Mallik.

Owing to indisposition Mr. W. T. Blanford was unable to exhibit, as announced, the specimens of pottery, copper ornaments, flint flakes, &c., sent by Capt. Mockler from Balúchistán.

Mr. Blochmann exhibited several Arabic and Persian inscriptions, of which rubbings had been received from Mr. J. G. Delmerick, Dihlí, and Mr. J. R. Reid, C. S., A'zamgarh.

He said—The rubbings received from Mr. Delmerick formed two sets, one taken at Hiçár Fírúzah, and the second, at Hánsí. The latter would be laid before the Society at the next meeting. Mr. Reid's rubbings were taken from various places in the district of A'zamgarh, and as nearly every village of the district had been visited by Mr. Reid, he was sure that there were no other inscriptions to be found there.

#### Hisa'r Fírú'zah.

The town of Hiçár Fírúzah was founded in 757 H., or A. D. 1356, by Fírúz Sháh III. of Dihlí, at a place formerly called Aráunan, or, according to some MSS., Rás, in connection with his canal. Below the castle of the new fort (*hiçár*), he made a wide reservoir, and filled it with water from his canal. *Vide* Cunningham, Arch. Reports, Vol. V, p. 142.

According to the *Zafarnámah*, Hisár Fírúzah was visited by Timur on the 5th Rabí' I, 801 (15th Nov. 1398), who on the same day proceeded to Sarsutí, now called Sirsá, which was plundered and burnt. Bhatner had shared the same fate before, and Fathábád and Ahroní followed. 'Not a house was left standing'; the inhabitants were killed and the fugitives were pursued by cavalry. The district seems never to have revived from the ravages committed by Timur's soldiers.

In 811 H. (1408 A. D.), Sultán Muhammad wrested Hisár Fírúzah from Qiwám Khán, to whom Khizr Khán, in 809, had given it. In 832 (1428-29 A. D.), Malik ush-sharq Mahmúd Hasan commanded the district; and in 838 (1434-35), Hisár was given to Iqbál Khán.

In 925 H. (1519 A. D.), it was taken by Bábar's troops from Hamíd Khán. The town and the district were shortly after set aside for the household of Prince Humáyún.

According to some authorities, Sher Sháh was born at Hisár (others, perhaps more correctly, say at Nárnaul), where his grandfather Ibráhím Khán Súr had taken service with Jamál Khán Sárangkhání.

On Humáyún's return from Persia, Hisár Fírúzah became the appanage of Prince Akbar. Akbar afterwards gave it for the same purpose to Prince Salím; Jahángír gave it to Prince Khurram; and Sháhjahán, in 1043 (1633 A. D.) gave it to Dará Shikoh.

During the reign of Akbar, Hisár Fírúzah is mentioned as a mint-place for silver and copper coins. The district supplied the *ghí* for the imperial household, and was often visited as a favorite hunting-ground.

The *Tuzuk-i-Jahángírí*, *Pádsháhnámah*, and *Tuzkirah-i-Saláţín-i-Chaghtáiyah*, mention the following Faujdárs of Hisár Fírúzah—

In 1016 H. (1607 A. D.), Mubárák Khán Sarwání.

1018 H. (end of 1609), Saif Khán Bárha.

1023 H. (1614), Hashim Khán.

1025 H. (1616), Muhammad Husain, brother of Khwájah Jahán.

1042 H. (1632), Kripá Rám Gaur.

1043 H. (1633), Muhammad 'Alí Beg.

1129 H. (1717), Salábat Khán Bárha.

Disturbances seem to have been frequent in the district. In 1614 A. D., we hear of disturbances caused by Dálpát Singh (*A'in Translation*, I, p. 359); in the last year of Sháhjahán's reign, Lashkar Khán had to quell disturbances in Hisár and Bíkánír; and in 1131 H. (A. D. 1718), Najm-uddín 'Alí Khán was sent to Hisár by the emperor Farrukh-Siyar to keep rebels in check.

Of Hisár celebrities, I find the following—

1. Shaikh Junaid, a saintly descendant of the great Shaikh Faríd-ud-dín Shakkar-ganj of Dípálpúr (the old Ajodhan). Junaid, according to the *Khazínat-ul-Agfiá* (p. 398), lived and died at Hisár, where his tomb is still shewn. He wrought many miracles, and was also known for the extraordinary rapidity with which he could write. He died in 900 H. (1494 A.D.). *Vide* below Inscriptions III and IV.

2. A poet who received from Akbar the *nom-de-plume* of Mihnátí, 'the drudge'. He was Qází of Sarhind, where he died. *Baddóní* (III, 337) gives a few of his verses.

3. Dáúd Khán, the conqueror of Palámau and founder of the town of Dáúdnagar in Southern Bihár, where his descendants still live. He died in 1084 H. (1673 A. D.). A biographical notice by me will be found in the *Indian Antiquary*, Vol. I, p. 77.

Regarding the various Jat tribes in Hisár Fírúzah, *vide* Elliot's *Races of the N. W. Provinces*, by Beames, Vol. I, p. 130; and regarding the western boundary of the district, and its parganaahs, Vol. II, pp. 17, 18, 133.

Mr. Delmerick's Hisár inscriptions amount to twelve; of No. I he sent a reading. Among the inscriptions the reign of Humáyún is well represented. I now give my readings and translations.

## I.

From a mosque near the Taláki (طلاقي) gate, Hisár, west (metre, long *ramal*).

يا حافظ      بسم الله الرحمن الرحيم      يا حفيظ  
مسجد جامع مرتب شد بعون ذو الجلال \* همچو كعبه در كمال و همچو قبله در جمال  
نزد او چاه معظم همچو زمزم چشمه دار \* آب او همچو دم عيسى است در رفع ملال  
اين دوجا شد ز امير بي بي فاطمه خاتون كه آوست \* مادر خان معظم قطبنخان با كمال  
در زمان دولت بهلول شاه دين پناه \* آنكه مثل او نباشد هيچ شاهى در قتال  
دويمى روز از جمادى الاولى تاريخ بود \* و از كه هجرت گذشته هشتصد و هفتاد سال  
سنه ۸۷۰

In the name of God, the merciful, the clement!  
O Preserver! O Guardian!

1. The Jámí' Mosque was erected with the help of the Lord of glory; (it is) like the Ka'bah in perfection, like the *Kiblah*\* in beauty.
2. Near it is a large well with a spring like the Zamzam; its water, like the breath of Christ, removes sickness.
3. Both were built by order of the lady Fátimah Khátún, who is the mother of the mother of the great Khán, the distinguished Kutb Khán,
4. In the time of the reign of Buhlúl Sháh, the protector of the faith, of him like whom no other king is in battle.
5. The date is the 2nd day of Jumáda I, and 870 years had elapsed since the time of the Flight. [21st December, 1465.]

## II.

From the Mausoleum outside the Nágóri Gate, South. The rubbing measures 8 ft. 2 in. by 5 in.

بسم الله الرحمن الرحيم  
لا اله الا الله محمد رسول الله صلى الله عليه  
نقل اين سلطان المشايخ و الاوليا شيخ محمد بن شيخ محمود چشتي فى التاسع  
من شعبان سنه اثني وتسعين وثمانماية ١١

In the name of God the merciful, the clement!

There is no God but Allah, Muhammad is Allah's prophet, may God bless him!

The departure of this king of the Shaikhs and the Saints, Shaikh Muhammad, son of Mahmúd, the Chishtí, took place on the 9th Sha'bán, 892 [31st July, 1487].

\* As *Kiblah* is here opposed to the Ka'bah, it seems to refer to Jerusalem (*Bait-ul-kuda*).

## III and IV.

These two inscriptions come from the same Mausoleum as Inscription II. They measure 6 ft. 10 in. by 9 in., and 6 ft. 2 in. by 5 in., respectively. It looks as if the builder Junaid was the same as Shaikh Junaid, mentioned by me above among the 'Hisár Celebrities'. The date of his death, as given in the *Khazínah* would be too early; but the fact that he is called 'Ajo-dhaní' seems to prove the identity.

The spelling 'Achodhaní' for 'Ajodhaní' is quite clear in the rubbing.

بسم الله الرحمن الرحيم

الغرة من ربيع الاول سنة سبع وعشرين وتسعمائة بانيه جنيد بن چندن

On the 1st Rabi'-ul-awwal, 927. The builder is Junaid, the son of Chandan. [9th February, 1521].

الغرة من شهر ذى القعدة سنة احدى وثلاثين وتسعمائة بانيه جنيد بن چندن  
بن محمود اچودھنی

On the 1st Zí Ka'dah, 931. The builder is Junaid, son of Chandan, son of Mahmúd, of Achodhan. [20th August, 1525.]

## V.

From a mosque outside the Dihlí Gate, situated in the Sarái Nathúá Bhatyará (a baker). Four lines, 2 ft. 5 in. by 1 ft. 3 in.

بسم الله الرحمن الرحيم

قال النبي عليه السلام من بني مسجد الله بني الله تعالى له بيتا في الجنة بعد  
توفيق الله الملك العالم وبركت حضرت رسالت عم در عهد ميمون ودولت ايام  
افزون خدایگان ناصر جهان عادل الزمان سلطان الهند و الخراسان رافع رايات  
المجاهدات والمغازي محمد همايون پادشاه غازي خلد الله ملكه وخلافة و ابد  
على العالمين عدله ورافته بنا كرد و مزين گردانيد اين مسجد مرغوب بعمار خوب  
بهرضات حضرت معبود بنده اسيدوار رحمت پروردگار المستعين بالله و لرحمان  
الملتجي نظر قلبي ابن شاه قلى خان المعروف نظام الدين خان تركمان زاد الله تعالى  
ما عطاء و بلغه الى ما يتمناه بحرمته [سيد] الابرار و الاخيار مؤرخا في الرابع من شهر  
شعبان ختمه الله. بالظفر و الامان سنة ٩٣٩ كاتب حروف عبد الله يوسف احمد  
بن ركن الدين

In the name of God, the merciful, the clement!

The prophet (upon whom be peace!) says, 'He who builds a mosque for God, will have a house built for him by God Almighty in Paradise. After the grace of God, the King, the omniscient, and the blessing of the Lord of prophethip (on whom be peace!), in the auspicious time, and the day-increasing reign of the sovereign, the helper of the world, the just one of the age, the king of India and Khurásán, who raises the standard of holy strife and war, Muhammad Humáyún, Pádsháh-i-Ghází,—may God perpetuate his reign and spiritual rule and extend over all ages his justice and his compassion!—this fine mosque was built and adorned, in beautiful struc-

ture, in order to please the Lord who is adored, by the slave who hopes in the mercy of the All-nourisher, who seeks help from God and takes refuge with the Merciful, Názár K ulí, son of Sháh K ulí Khan, who is known as Nizám-uddín Khán, the Turk-mán,—may God increase what He has given him and bring him to what he desires, for the honor of the chief\* of the pious and the saints! Dated 4th Sha'bán (may God allow the month to end in victory and security!), 939. [1st March, 1533.]

The writer of these letters is 'Abdullah Yúsuf Ahmad, son of Rukn-uddín.

## VI.

From the Jámi' mosque of Hisár. The inscription consists of nine lines, and measures 1 ft. 11 in. by 1 ft. 5 in.

بسم الله الرحمن الرحيم  
 و ان المساجد لله فلا تدعوا مع الله احدا و انه لما قام عبد الله يدعوه كادوا يكونون  
 عليه لبدا \* قال عليه السلام من بني لله مسجدا ينبغى به وجه الله بني الله له في  
 الجنة مثله \* تمام شد اين مسجد در ايام دولت شهنشاه الاعظم و الخاقان المعظم  
 مالك رقاب طوايف الاصم من الهند و الترك و العرب و العجم السلطان الفاضل  
 الكامل الولي الولي و الخاقان العادل العلى العالى الذى وجب اطاعته كاطاعة الله  
 و رسوله بحكم اطيعوا الله و اطيعوا الرسول و اولى الامر منكم حافظ بلاد الله ناصر  
 عباد الله رافع رايات المجاهدات و المغازى محمد همايون بادشاه غازي خلد الله  
 تعالى ملكه و في بحار اللطف اجرى فلكه بسعي جناب سعادت فرجام زبدة فضلاء الانام  
 نتيجه امراء العظام امير محمد بن عاليجناب امارت مآب مملكت پناه نظام الدين  
 بيك ميروك بن جناب المغفور المبرور خوشكيلدى \* \* \* بن جناب مغفرت مآب  
 \* \* \* \* \* فردوس مكاني \*  
 شد بني مسجد بهر خدا اندر حصار \* كور فيع القدر آمد همچو كيوان سربلند  
 بس كه عالي قدر و كيوان هيئت و موزون فتاد \* هر كه دين افتاد اورا طرح اين مسجد پسند  
 چون پسند آمد تمام اهل دل تاريخ او \* باب \* \* \* \* \* رحمت گفته اند  
 سنه ٩٤٢  
 كاتبه و قائمه نظام \* \*

In the name of God, the merciful, the element!

'The mosques belong to God. Do not associate any one with God. When the servant of God rose up to pray to Him, it nearly happened that they [the *jinn*s] pressed on him in crowds' [Korán, lxxii, 18, 19.]. The Prophet says 'He who builds a mosque for God desiring thereby God's honour, will have one like it built for him by God in paradise.' This mosque was finished during the time of the reign of the great king of kings, the exalted prince, the master of the necks of crowds of nations among the Indians, Turks, Arabs, and Persians, the accomplished Sultán, the perfect, the chief, the ruler, the just prince, the high, the exalted, whom to obey is as necessary as to obey God and the Prophet, according to the Korán verse 'Obey God and obey the Prophet

\* *Sayyid*. The word is left out in the inscription; but the phrase is common, and the conjecture is easy.

and those who have authority among you,' the guardian of God's countries, the helper of God's servants, who raises the standard of holy strife and war, Muḥammad Humá'yún, Báds'háh-i-ghází—may God Almighty perpetuate his kingdom and guide his ship in the seas of His favor!—through the exertion of the auspicious dignitary, the cream of the accomplished among men, the issue of great Amírs, Amír Muḥammad, son of the distinguished noble, the meritorious Nizám-uddín Beg Mírak, son of the pardoned and purified Khushkildí \* \* \* son of \* \* \* of Bábar.

1. A mosque has been built in Hisár for the sake of God, which is as high in dignity as the seventh heaven.

2. Because it is high in dignity, and has the aspect of the seventh heaven, and has turned out well adjusted, every one who saw it has approved of the style of this mosque.

3. Because all people of sense approved of it, its chronogram is \* \* \* \* (illegible). A. H. 942 [A. D. 1535-36.]

The writer and composer is Nizám \* \* \*

## VII.

From a Maḵbarah outside Hisár, about a mile eastward, near the house of Col. Foster, Dy. Commissioner, Hisár. 1 ft. 1 in. by 1 ft. 2 in.

بسم الله الرحمن الرحيم  
در عهد میمون و دولت محمد همایون خلد ملکه و سلطانه و اعلیٰ امر و شانه  
این عمارت \* \* \* والتو خان \* \* \* بن میر \* \* \* بن سلطان ملک بک در غرة ماه  
رمضان سنه ثلاث و اربعین و تسعمایه \* \* \* شد ||

In the auspicious time and reign of Muḥammad Humá'yún—may God perpetuate his kingdom and his rule and elevate his condition and dignity!—this building was \* \* by Wáltú Khán \* \* son of Mír \* \* son of Sultán Malik Beg, on the 1st Ramazán 943.

Along the right hand side of the inscription the following words are found—

این \* \* گنبد \* \* بست هزار تنگه \* \* باهتمام شیخ منور بن قاسم اتمام شد ||

This \* \* vault \* \* \* 20,000 *tāngahs* \* \* \* was completed under the superintendence of Shaikh Munawwar, son of Qásim.

It is possible that the Wáltú Khán of this inscription is the Báltú Khán mentioned in my *Aín Translation*, Vol. I, p. 475, No. 207.

## VIII and IX.

Both inscriptions come from the same Maḵbarah as No. VII. They measure 2 ft. 8 in. by 1 ft. 9 in. and 2 ft. 6 in. by 1 ft. 5 in., respectively.

بسم الله الرحمن الرحيم  
در عهد میمون و دولت همایون سلطان الهند و الخراسان رافع ریایات المجاهدات  
و المغازی محمد همایون بادشاه غازی خلد خلافته این عمارت بقاریخ ماه رجب  
رجب قدره سنه اربع و اربعین و تسعمایه تمام شد و این گنبد بر تودی کوچک



بن میر بنطق مغل شده است و این جوان در لشکر گجرات شهادت یافت و مبلغ  
پانزده هزار تنگه سیاه خرج شده است ۱۱

. In the name of God, &c. In the auspicious time and the august reign of the king of India and Khurásán, who raises the standard of holy strife and war, Muhammad Humáyún, Bádasháh-i-ghází—may God perpetuate his rule!—this edifice was completed during Rajab (may the dignity of the month increase!) 944. [January, 1538.] And the vault was made for the sake of Turdí Beg Kújak, son of Mír Barantaq the Mughul; and this youth was killed in the Gujrat war. The cost was 15,000 black *tangahs*.

بسم الله الرحمن الرحيم

در عهد میمون و دولت همایون سلطان الهند و الخراسان رافع رایات امجاهدات  
و المغازی لجهد الدین محمد همایون بادشاه غازی خلد خلفته بتاریخ ماه رمضان  
سنه اربع و اربعین [تسعمایه] این عمارت از \* \* میر عاشق محمد بن میر شاه  
علی شد و این جوان در لشکر گجرات شهادت یافت و مبلغ دوازده هزار تنگه  
سیاه خرج شده ۱۱

In the name of God, &c. In the auspicious time and august reign &c., [as above]—this edifice was completed during Ramazán, 944. [March 1538]. And this edifice was made on account of \* \* Mír 'Ashiq Muhammad, son of Mír Sháh 'Alí; and this youth was killed during the Gujrat war. The cost was 12,000 black *tangahs*.

## X.

From a dome outside Hisár, about a mile to the east, inside the Commissariat godowns. 1 ft. 5 in. by 1 ft. 10 in. The poetry is execrable (metre, *Mutakárib*).

|                             |                         |
|-----------------------------|-------------------------|
| گل و خشت او مشک و عنبر سرشت | خوشا گنبد روضه چون بهشت |
| روان سلسبیل ز اشجار و کشت   | ز انفاس باغش معطر دماغ  |
| که تاریخ برگنبد آمد نوشت    | دیب و فلك گشته برگرد او |
| سنه ۹۷۵                     |                         |
| که حکمش به بنیاد بنهاد خشت  | هزار آفرین بر ابای یزید |
| کاتب کبیر                   |                         |

1. How beautiful is the dome of the paradise-like mausoleum; its mortar and bricks are like musk and ambergris.
2. From the scent of the garden the brain is perfumed; and a Salsabil (a spring in paradise) flows from its trees and meadow.
3. The secretary of heaven [Mercury] turned round it, when the date was written on the dome: A. H. 975 [A. D. 1567-68].
4. Much praise is due to Bá Yazíd, by whose order the bricks were placed on the foundation. Written by Kabir.

## XI.

From a mosque in the yard of 'Sher' Buhlál's mausoleum, outside Hisár, one mile to the south. The rubbing is 2 ft. 5 in. square, and the characters are in well-formed *Nasta'lík* (metre, long *ramal*).

پیروے شرع رسول مجتبیٰ عبد النبی  
پیش سخن روضہ بہلول شاہ افکند طرح  
آنکہ دیدارش دہد آئینہ دل را جا  
مسجدے عالی کہ باشد مسکن اہل دعا  
بے تکلف ہائے زد بانگ کاہن مصوع ز پس  
در ہزار و یکصد و شش یافت اتمام این بنا

1. The follower of the law of the Prophet, the chosen one, 'Abd-un-nabí, whose sight gives brightness to the mirror of the heart,

2. Erected before the courtyard of Sháh Buhlál's mausoleum a grand mosque, which is to be the dwelling of worshippers.

3. A voice from heaven announced without difficulty the final hemistich, 'This building was completed in 1106. [A. D. 1694-95.]

## XII.

From the Dargáh outside the Taláki gate. 1 ft. 2 in. by 6½ in. (metre, *Khafífi*.)

بسم الله الرحمن الرحيم  
شاہ ایوان فقر اسمعیل یافت از حق برات بر فردوس  
سال می جستیم از خرد ناگاہ گفت ہائے بروت در فردوس  
نام حکاک پیر بخش ساکن بیگانیر فرمودہ مولوی اسم بخش صاحب مہدائی  
تخلص دہلوی سنہ ۱۲۳۶

1. The king of the palace of poverty, Ismá'íl, received from God an order on paradise.

2. I was searching for a chronogram, when a voice from my heart suddenly said, 'He went to paradise.' [A. H. 1236; A. D. 1820-21.]

The name of the engraver is Pír Bakhsh, an inhabitant of Bíkánír. By order of Maulawí Imám Bakhsh Sháhíh, whose *nom-de-plume* is Shabbái, of Dihilí.

Regarding Imám Bakhsh Shabbái, *vide* Garcin de Tassy, *Histoire de la Littérature Hindoue et Hindoustanie*, Vol. III, pp. 22 to 26.

For other inscriptions belonging to the neighbourhood of Hisár, *vide* my readings and translations of Mr. Delmerick's Abúhar and Sirsá Inscriptions, in *Proceedings, As. Socy. Bengal*, for March, 1874, p. 72 (where on l. 22 'uncle' must be corrected to 'father').

## District A'zamgarh.

## I.

*From a Mosque in the village of Ganjahra, Parganah Muhammaddábád.*

در زمان شاہ عالم گیر دین پرور کزو رونق دین محمد ہست افزون از قیاس  
شد بنا از فیض خورشید کرم للمؤمنین مسجدے کز نور آن انجم نہاید اقتباس

حاملان عرش گفتند از کمال کیست این گفتند از ابن الکمال است این کمال حق شناس  
 رفعت شانیش به بیت الله میباند به فضل ذرؤ او جش باوج آسمان کرده مساس  
 سال تاریخش چو پرسیدیم زیبر عقل گفت از محمد صالح است این مسجد احسن اساس  
 سنه ۱۰۹۹

1. In the time of the Emperor 'A'lamgir, who fosters the faith, and through whose splendour the religion of Muhammad has increased beyond expectation,

2. This mosque was built for the pious through the kindness of the sun of generosity—a mosque from the radiance of which the stars borrow (their light).

3. The carriers of God's throne asked, 'What perfect man has done this'; and I said, 'This perfection of piety comes from the scion of perfection.'

4. Its exalted shape resembles the House of God [the *Ka'bah*] in excellence; the top of its summit touches the summit of the heaven.

5. When I asked for a chronogram, Genius [*pr.* the old man of thought] said, 'This mosque of excellent foundation was built by Muhammad Sâlih,' A. H. 1099. [A. D. 1687-88.]

I do not know whether the builder is the same as the Muhammad Sâlih who is mentioned several times in the '*A'lamgir-nâmah*' and the '*Mâdsir-i-'A'lam-giri*'.

## II.

*From an old mosque at the ruined village of 'Kasbah,' properly Kasbah Nigûn, Parganah Mâhul.*

بعهد محمد همایون . . . . . الفقیر محمد عطا بن دوست قلی کابلی سنه اربعین  
 وتسعمایه ۱۱

In the reign of Muhammad Humáyûn.....the poor Muhammad 'Atâ, son of Dost Qulî, the Kâbulî. A. H. 940 [A. D. 1533-34].

Sher Shâh spent some part of his early life in Nigûn.

## III.

*On a broken slab found in the village of Chakesar, Parganah Ghosî.*

Chakesar was formerly the name of a parganah. It is now a tappâ, and is included in Parganah Ghosî.

بنا شد مسجد جامع بفيض فضل رباني \*  
 بعهد شاه فیروز آن شه عالم کے بر شاهان \*  
 محراب و مسجد \*  
 بتاریخ نبی بودست هفصد هشت \*

1. The Jâmi' mosque was built with God's blessing.....

2. In the reign of King Fîrûz, that king of the world who over all kings....

3. — niche and mosque....

4. According to the era of the Prophet it was in 78, that.....

The left half of the slab is broken off. The characters of the inscription are the same as on the Iríh inscription of A. H. 815, published by me in Proceedings, A. S. Bengal, for March 1874, pp. 69, 70. On both inscriptions the word 'kih' is spelt 'ke', though the metre shows that 'k' is short.

## IV.

*From a stone at the Dargáh of Pír Káshání in Muhammadábád Khás, Parganah Muhammadábád.*

The rubbing is illegible, and the name of this saint from the town of Káshán (in Persia) is not known to me.

The following papers were read—

1. *Note on the old Manipurí Character.*—By G. H. DAMANT, C. S.,  
*Officiating Political Agent, Manipur.*

(Abstract.)

The Manipurí alphabet appears to be a form of the Devanágari, and was, in all probability, introduced from Bengal along with Hinduism by some wandering *sanyási* in the reign of Charairongba (1700 A. D.). The alphabet is ill-adapted to the wants of the language, but is used by the 'maibeas,' or priests, who keep up a national chronicle, in which every event of importance is recorded.

The number of Manipurí MSS. is exceedingly limited. Mr. Damant mentions five, and gives a facsimile, transliteration, and translation, of the first page of the 'Samsokgnamba.' *Vide* Journal and Proceedings for 1875.

The paper will appear in No. 1, of Pt. I, for 1877.

MAJOR GODWIN-AUSTEN said—There is but little doubt that the Manipurís are a mixed race drawn from the Hill-tribes that encircle the valley, particularly the Nága. Even now a certain intermixture of blood goes on through the connections formed by Manipurís with Hill women that come down into or live in villages contiguous to the valley, or take service in Manipuri households. He believed also that men of the Hill-tribes are admitted into the Hindu community.

2. *Descriptions of three new species of Birds belonging to the genera Pomatorhinus, Actinura, and Pellorneum, from Saddyu, Assam.*—By Major H. H. GODWIN-AUSTEN.

(Abstract.)

This paper contains the descriptions of three interesting new forms recently collected by Mr. M. T. Ogle in the neighbourhood of Saddyu,

Assam, viz., *Pomatorhinus stenorhynchus*, *Actinura Oglei*, and *Pellorneum pectoralis*.

The characters of some of the other specimens were briefly noticed, and the close relationship of *Actinura Oglei* with *Turdinus guttatus*, Tickell, from Tenasserim, pointed out. The other forms, probably new (further examination being necessary), were provisionally noted as *Ohleusasicus atroperciliaris*, *Abrornis flavogularis*, and *Turdinus Williamsoni*.

3. *Description of two new Species of Freshwater Crustacea obtained by Mr. O. Limborg in the Hounng-da-rau Valley, Tenasserim.*—By J. WOOD-MASON.

(Abstract.)

The author exhibited and read descriptions (i) of *Paratelpusa Limborgi*, which is said to differ from its near ally *P. Edwardsii* (from the streams of the flat country lying along the base of the hill-ranges of the N. E. Frontier of India) in the great development and prominence of the extraorbital angles and of the front, which latter is also broadly emarginate, in its slenderer legs, in the ungrooved condition of the 2nd joint of its external maxillipeds, &c., and (ii) of *Telpusa lobifrons*, in which the front is divided by a broad and deep indentation of its surface and by an emargination of its free edge into two lobes, themselves slightly emarginate, in which the external margin of the extraorbital tooth is equal in length to half the width of the front, in which the posterior margin of the carapace and the front are of equal width, &c.

The collection sent up by Mr. Limborg also contains numerous examples of *Telpusa Larnaudii*, A. M.-Edw., but none of *Paratelpusa Sinensis*—a form that abounds in the neighbourhood of Moulmein.

4. *Note on a case of Death by Lightning in a Mine, communicated by I. J. WHITTY, Esq., Supdt. of the Kurhurbari Collieries, Giridhi.*

A remarkable case of death by lightning in a mine has been communicated by I. J. Whitty, Esq., Supdt. of the Kurhurbari Collieries. The mine is a shallow one, worked by levels driven on the side of a flat-topped hill, only 20 feet from the surface, which is therefore the thickness of rock above the coal seam. The working-face, where the accident occurred, is about 130 feet from the opening. There were a number of miners in the drift at the time. Those near the entrance were unaffected. The two who were killed (a man and a woman) were at the working-face in adjoining galleries, separated by about 12 feet of coal. Two other miners nearest to the face were knocked down and severely stunned. They were all natives; and the only account that they could give of what occurred was, that sparks

seemed to come out of the pillar of coal between the two who were killed. They say they were not aware there was a thunderstorm going on.

Mr. Whitty states that no mark of any kind could be observed on the bodies, nor anywhere in the mine or on the tools lying about; but that a young *sál* tree standing as nearly as possible over the position of the accident was slightly damaged, and that in the ground at its base a hole, about one inch in diameter, seemed to have been formed by the lightning.

The little hill, or plateau, in which the mine is situated is one of a small irregular group in the centre of the coal-field, about 200 feet high. It is formed of the coal-measure sandstone. The drainage is thorough, and the mine was quite dry. From the presence of the workmen, the sides of the gallery and the air in it were probably damper than the rock. The tree, or other vegetation on the hill is scanty.

The accident occurred at about 1.30 p. m. on the 31st January. There had been no rain from 15th October to 12th January, when one inch of rain fell. There were some intermediate showers, and 0.96 fell on the 31st, the total for the month being 2.42 inches.

Mr. H. F. BLANFORD said that a lesson of great practical importance might be learned from the very remarkable case communicated by Mr. Whitty, *viz.*, the very low conductivity of rock *in situ*, unless saturated with water. Notwithstanding the enormous sectional area of the rock-conductor presented by the mass of the hill, so low was its conductivity that the discharge took place through the bodies of these unfortunate workmen, in sufficient quantity to kill two of them and injure others. Now, looking at the manner in which the great majority of the lightning rods attached to houses in Calcutta terminate below, we can fully understand that they must be useless or even worse than useless. There is one on a house occupied by the Bengal Club, which terminates on the top of a post, and at the very best, they generally leave about a foot of the lower end buried in ground which is kept pretty dry by the drainage into the Calcutta sewers. Such rods can offer no protection, and, as if to ensure their inutility, they never range to a sufficient height to command more than a protected radius of 3 or 4 feet. It is little wonder that we constantly read of houses which are provided with lightning rods being struck by lightning, the rod taking no part in the discharge.

The CHAIRMAN remarked that it not unfrequently happened that persons who had been killed by lightning manifested no outward sign of injury. Such was the case in an instance that occurred on the Calcutta maidan a short time since, where death had been instantaneous. Had it not been for the circumstance that the man happened not to be alone and that his companion though thrown down escaped with only temporary nervous derangement, the cause of his death must have remained a matter of

conjecture merely, as although the body was examined a few minutes after the occurrence, nothing could be detected indicative of the cause of death. Unfortunately our knowledge of the minute texture of the organs and tissues of the body is not sufficiently advanced to enable a definite opinion to be given regarding the precise cause of death in cases of this kind when unaided by circumstantial evidence.

In this case also there were no marks on the roadway suggestive of anything unusual having occurred, or to indicate the spot where the discharge had struck the ground.

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### LIBRARY.

The following additions have been made to the Library since the Meeting held in March last.

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IMPERIAL ACADEMY OF SCIENCES, VIENNA.

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23. Wie kam der Verfasser des 10ten Vārttika zu Pānini VII, 3, 87 dazu, eine Wurzel späç mit langem ā anzunehmen.

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Vol. 84. No. 8. *M. G. Govi*.—Sur un moyen de faire varier la mise au foyer d'un microscope, sans toucher ni à l'instrument, ni aux objets et sans altérer la direction de la ligne de visée. *M. Fayel*.—Nouveau procédé de photomicrographie. *M. Neyreneuf*.—Sur le microscope et la chambre noire. *M. F. Carro*.

—Sur la fabrication de conducteurs en charbon pour la lumière électrique. *M. Rabuteau*.—Sur la localisation du cuivre dans l'organisme après l'ingestion d'un sel de ce métal.

No. 9. *M. J. Guérin*.—Expériences sur l'origine et la nature de la fièvre typhoïde. *M. F. de Romilly*.—Sur les effets du jet d'air dans l'eau et sur la suspension de l'eau dans l'air. *M. L. Smith*.—Sur trois chutes récentes de pierres météoriques dans l'Indiana, le Missouri, et le Kentucky. *M. M. V. Feltz et E. Ritter*.—Expériences sur l'empoisonnement aigu par le sulfate de cuivre.

No. 10. *M. P. Cazeneuve*.—Action de l'hydrosulfate de soude sur l'hématosine du sang. *M. M. Raynaud*.—Etude expérimentale sur le rôle du sang dans la transmission de l'immunité vaccinale. *M. A. D'Arsonval*.—Du maintien des températures constantes.

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No. 26. Le Typhon du Golfe du Bengale.

No. 35. L'Armée Russe.

No. 36. *M. H. Kühne*.—Les coloration de la rétine et la photographie dans l'œil.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR MAY, 1877.

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The Monthly General Meeting of the Asiatic Society was held on Wednesday, the 2nd inst., at 9 o'clock P. M.

W. T. BLANFORD, Esq., Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the editor, C. Morehead, "Memorials of the Life and Writings of the Rev. R. Morehead, D. D."
2. From the author, "The Materia Medica of the Hindus," compiled from Sanskrit Medical Works, by Uday Chand Dutt.
3. From the author, "Serpent and Siva Worship and Mythology in Central America, Africa, and Asia," by Hyde Clarke.
4. From the authoress, "The Mountain Karen Colony in Toungoo, Burma," by Mrs. E. Mason.
5. From Bábu Haris Chandra of Banáras, through Dr. Rájendralála Mitra, a Tibetan drawing of Buddha and his disciples.

The following gentlemen, duly proposed and seconded at the last Meeting, were elected Ordinary Members—

Mr. J. A. Bourdillon.

Mr. W. Sandford.

The Hon'ble T. E. Ravenshaw, C. S.

The following are candidates for ballot at the next Meeting—

1. H. K. W. Arnold, Esq., proposed by Major H. H. Godwin-Austen, seconded by J. Talboys Wheeler, Esq.
  2. The Mahárájá of Darbhanga, proposed by H. B. Medlicott, Esq., seconded by Capt. J. Waterhouse.
- A. W. Croft, Esq., for re-election, proposed by H. F. Blanford, Esq., seconded by W. T. Blanford, Esq.



The CHAIRMAN announced that, in accordance with the notice given at the March Meeting, the votes would be taken whether the following rider to Rule 64 should be added to the Rules of the Society.

*Before circulating any question coming under clause (c) of Rule 64 for the votes of the general body of members of the Society, the Council shall cause to be sent to every resident member, at least 48 hours before the General Meeting at which such question is to be proposed, a printed circular in which shall be set forth the nature of the proposal and the reasons for it, in order that it may be duly discussed at such General Meeting. A statement of any objections that may be raised at the Meeting against the proposal shall also be circulated with the voting papers.*

Mr. Waldie and Major Godwin-Austen were appointed Scrutineers and reported that there were 62 votes for the addition and 2 against it. The CHAIRMAN thereupon announced that the proposed Rule had been carried.

The CHAIRMAN announced that Col. J. F. Tennant had been appointed a Member of Council in the place of Dr. D. B. Smith.

The SECRETARY read extracts from a letter from Dr. Dobson stating that Mr. Geflowski was about to commence work upon the bust of Dr. Oldham, and that the marble bust of Dr. Stoliczka by the same sculptor was also in progress and nearly finished.

Mr. W. T. BLANFORD called attention to some recent researches by Prof. Jeitteles, of Vienna, on the origin of the domestic dog, researches which have a peculiar interest in India, because in Professor Jeitteles' opinion two common Indian animals are amongst the most important wild species from which the various forms of domestic dog are descended. Other authors have already concluded that several wild forms of wolves and jackals have been tamed by man in various parts of the world and that different races of dogs have thus originated, many of the races having of course undergone great modification through the process of artificial selection by man and from other causes. ✓ Most of the details known before 1868 were given by Darwin in his work on 'Domesticated Plants and Animals' and the conclusions at which he arrived, that domestic dogs are derived from several different wild species, appear to be confirmed by Prof. Jeitteles, although the researches of the latter have shewn that some forms formerly supposed to have contributed to the ancestry of domestic dogs must be omitted from amongst the races from which various kinds of dogs are derived and others previously unsuspected must be included.

Professor Jeitteles' first contribution to this very interesting question appears to have been the examination and comparison of dogs' skulls found with human remains of the stone age. An animal had already been de-

scribed by Rüttimeyer from the pile buildings (*Pfahlbauten*) or lake dwellings of Switzerland as the peat dog (*Torf-hund*) *Canis familiaris palustris* and considered a form intermediate between wolves and jackals. Professor Jeitteles considers that the skull of this dog is absolutely identical with that of the jackal, *Canis aureus*. He also shews that many of the modern smaller races of dogs are in all probability descended from the same ancestor. The Asiatic jackal, as is well known, becomes very rare east of the Bay of Bengal, and is unknown in Southern Burma, the Malay Peninsula, Siam or China, whilst to the westward it extends a considerable distance into Europe, being found in Turkey and Greece, and it ranges throughout northern Africa.

Professor Jeitteles remarks that in some of the smaller races of dog, especially terriers, owing to thorough domestication, and the combined effect of more highly developed intelligence and disuse of muscular power through many generations, the form of the jackal skull has been changed by the loss of the ridges to which the muscles are attached and the development of the brain cavity, so that the form recalls in a singular manner that of certain monkeys.

The next dog skulls to which Professor Jeitteles turned his attention were those of the dogs found associated with human remains of the bronze age at Olmütz and other localities. These are much larger than the dogs' skulls of the stone age, and differ in several peculiarities, especially in being much more wolf-like. Still they shew many differences from the skulls of the European wolf; they are smaller, and there are important distinctions in the dentition. After comparing the bronze age skulls with those of several wild species of African and American *Canidae*, they were at last found to agree with singular accuracy with the skull of the Indian wolf, *Canis pallipes*. The chief peculiarity of dentition in which the dog of the bronze age and the Indian wolf agree, whilst both differ from the common European wolf, is that in the two former the length of the carnassial tooth is less than that of the two hinder or tubercular molars in the upper jaw, whilst in the common wolf the reverse is the case.

Amongst living dogs, some shepherd's dogs appear most closely allied in the form of their skull to their probable ancestor of the bronze period. Poodles came nearest after the shepherd's dog.

Professor Jeitteles suggests that the Indian wolf is also found north of the Himalaya and Hindu Kush. In this view Mr. Blanford said he could not quite agree. The wolf of Central Asia is certainly a much larger form, the skins obtained by Dr. Stoliczka in Eastern Turkistan appeared to belong to the European wolf or a closely allied species, but unfortunately no skulls were brought. Dr. Severtzov also refers the wolf of western Turkistan to *Canis lupus*. The Persian wolf however is unknown;

but it is more probably allied to the European than to the Indian species, because the other mammals of the Persian highlands are Palaearctic forms. Even the wolf of the Baluchistan highlands is, there is every reason to believe, a larger animal than *Canis pallipes*. There is a smaller wild Canine in Persia known as *Sag-gúrg* (dog wolf) which, however, to judge by a flat skin, the only portion examined, is not the Indian wolf. A small slender form of wolf is stated by Professor Jeitteles on the authority of Professor Bagdanow of St. Petersburg to exist in the steppes between the Aral and Caspian.

One Asiatic wolf, however, that of the Tibetan highlands, *Canis laniger*, Hodgson, does appear to approach the Indian wolf to some extent. It appears to be somewhat larger, though inferior in size to the European wolf. The Indian Museum contains a fine series of skulls of the Tibetan wolf derived from the Society's old collection, and although these considerably exceed the skulls of *C. pallipes* in size, they shew the same peculiarity of the molar teeth, the "carnassial" being a little shorter than the two tubercular molars taken together. In five skulls of the Tibetan wolf the length of the former varies from 19 to 22 millimètres measured along its outside margin, that of the two latter together similarly measured from 21 to 23·5 mill. The length of the skulls from the anterior lower edge of the *foramen magnum* to the alveolar margin of the incisors measures in these five skulls (or rather in four, one being imperfect behind,) from 190 to 210 millimètres (7·46 to 8·25 inches).

Professor Jeitteles proceeds to trace the probable descent of the half-wild common street-dog of Egypt and the Levant from one of the African jackal-like animals *Canis lupaster*, Hemp. and Ehr. and of an African race of greyhounds from one of the forms of *C. anthus*, Cuv. With these we have no particular concern, but it is otherwise as regards the pariah dog of India. Professor Jeitteles is inclined to believe from the accounts given by various naturalists and travellers that there are two races of pariah; a larger, probably derived from *Canis pallipes*, and a smaller from *C. aureus*. Despite Jerdon's mention of the jackal-like dogs seen occasionally about Indian villages, it may be doubted whether any race of Indian pariah closely resembles the jackal, all appear to be much larger, and have rather the build of a wolf than a jackal. Mr. Blanford added that he was also unable to recognise two distinct races of pariah dogs, a small one and a large one; numerous variations in size occur of course, but he could not say that he had ever seen two well marked kinds. Larger dogs are kept by particular classes of natives for hunting purposes, and the common dogs appear always to run larger in those parts of India in which they are useful and can protect the flocks against the smaller carnivora, such as wolves and jackals, whilst they are small and starved from ill feeding in other parts of

the country where no care is taken of them. The subject, however, requires very much more attention than has been paid to it. One point to be remembered is that in many parts of India, around large European stations, there has been so great an admixture of the blood of European races, that a pure-bred pariah is a rarity.

It has long been known that we are probably indebted to the early inhabitants of India for two domestic animals, the buffalo and the peacock; the origin of the humped cattle is obscure, and the common fowl appears to be descendant of the Burmese and not of the Indian race. If Professor Jeitteles be correct in his views it appears highly probable that India will also claim the ancestry of some of our most valuable races of dogs. The chief reason for calling the attention of the Society to the subject is in order to suggest a further study of the pariah dogs of India. A good collection of skulls may aid considerably in working out the question of the dog's ancestry, and much light may be thrown upon the subject of the derivation of the races of men who inhabited Europe in the bronze age by determining the source whence they procured their domestic animals.

Mr. Blochmann exhibited some Arabic and Persian Inscriptions from Hānsī, received from Mr. J. G. Delmerick, Dihlī.

#### Ha'nsi'

Abul-Fazl, in his *A'in-i-Akbarī*, and Amīn Rāzī, in his *Haft-Ikūm*, speak of Hānsī as a place famous in ancient times. It is first mentioned in 427 H., or A. D. 1035-36, when Mahmūd of Ghaznī took the fort of Hānsī, which up to that time had been known as the 'Virgin.' A short description of the conquest is given in the *Tūrikh-i-Baihaqī*; vide Dowson, Elliot's History of India, II, 140.

From a Prithwī Rājā inscription of Samvat 1224, or A. D. 1167, published in the As. Researches, Vol. XV, and in the Transactions of the R. As. Socy. (Vol. I, pp. 133, 461), it would appear that Hānsī was also called Āsī, and that Prithwī Rājā had a palace there. Vide also Cunningham, Arch. Reports, Vol. V, p. 142.

Hānsī is frequently mentioned in the fights preceding the final capture of Dihlī in 589 H. (A. D. 1193). The oldest inscription found by Mr. Delmerick belongs to 593 H., or A. D. 1197; vide below Inscr. I.

In the end of the reign of Iltutmish (about A. D. 1236), Malik Saif-ud-dīn is mentioned as *zābit* (ضابط), or governor, of Hānsī (*Baddāonī* I, 70).

From the inscriptions given below it appears that 'Alā-uddīn Khiljī, in 1303 A. D., repaired the fortifications of Hānsī.

Under Kutb-uddīn Mubārak Shāh I. (1316 to 1320), we hear of a Malik Nizām-uddīn Shukrī Hānsīwāl. He built the Shukrī mosque at Hānsī, which was called 'Shukrī' ('thanksgiving'), because the five daily prayers

were read in it, and also prayers for the soul of the builder. *Ziyā-i-Baranī*, p. 380.

Hānsī is occasionally mentioned by the historians of the reign of Fīrūz Shāh III. (1351 to 1383, A. D.). Not long after his accession, Fīrūz Shāh, on a visit to Hānsī, was taken to task by the renowned Shaikh Kuṭb-uddīn of Hānsī, and was warned to give up wine drinking and hunting. Kuṭb's successor, Nūr-uddīn, refused the king's request to emigrate to Hisār Fīrūzah.\* Fīrūz Shāh had some reason to treat the Hānsī Shaikhs with consideration. Badāonī (I, p. 242) relates that Fīrūz Shāh, when only a Malik, received from Shaikh Naṣir-uddīn, the 'lamp of Dihlī', the promise of the throne of Dihlī. When Muhammad Shāh ibn Tughluq, the reigning king, heard of it, he gave orders to bring Malik Fīrūz and Shaikh Naṣir as prisoners to him in Sindh. When they passed Hānsī, Shaikh Badr-uddīn (a descendant of Shaikh Jamāl) exclaimed, 'Here they take a prisoner to his throne, and he knows it not.' On reaching Tattah in Sindh, the escort reported to Muhammad Shāh the arrival of the prisoners, and they were ordered to kill them at once. But as the king during the interview was drunk and his son had gone on a hunting expedition, the escort set Malik Fīrūz at liberty, who immediately, with the consent of the nobles, raised the standard of revolt, and had Muhammad Shāh's son killed. When Fīrūz Shāh returned as king from Sindh to Dihlī, he gave Shaikh Badr-uddīn Parganah Chaurāsī as a present.

Hānsī escaped the fury of Timur: the prayers of the saints protected the town, as well as Hisār Fīrūzah.

In 814 (A. D. 1411) we find that the district (*khittah*) of Hānsī was held by Maliks Idrīs and Mubārīz Khān his brother; and some time after, during the reign of Mubārak Shāh II., Hānsī was taken from Malik Rajab Nādir and was given to the Malik-ushshark, the king's nephew.

Ibrāhīm Lodī (1517 to 1525, A. D.) used the fort of Hānsī as a State prison. Hamīd Khān was governor during his reign. Hamīd Khān, who is mentioned below in Inscr. VI, was defeated by Prince Humáyūn in 1526. This victory was Humáyūn's first exploit; hence Bábar gave him Hānsī and Hisār Fīrūzah as *jágír*.

During the reign of Akbar, who on a visit to Hānsī in 986 H. (1578 A. D.) offered up prayers at the shrine of Shaikh Jamāl, Mahall Hānsī belonged to Sirkār Hisār Fīrūzah. It contained, according to the *Ā'in* 836115 bighahs, and was assessed at 5434438 dāms, or 135861 Akbarshāhī Rupees, inclusive of 130056 dāms (or 3251½ Rupees) *madad-o-ma'āsh* land. Abul Fazl mentions Rājputs, Multānīs, Jātūs, and Jats, as the principal tribes of the district and believed the *mahall* capable, or liable, to raise a force of 500 horse and 7000 foot.

Elliot in his Glossary (Beames, *Races of the N. W. Provinces*, I, pp.

\* This Nūr-uddīn of Hānsī was the preceptor of Shams-uddīn 'Affī, the historian.

83, 256), mentions the Dogars as a tribal element in Hānsi, and refers to the worship of Gogā Pīr, a local saint, who is invoked in the district between Hānsi and the Ghārā. *Vide* also Atkinson, *Gazetteer*, N. W. Provinces, Vol. III, p. 516.

It is curious that Hānsi is not mentioned by the historians of the reigns of Jahāngīr, Shāh Jahān, and Aurangzīb. Nor do the inscriptions given below belong to this period of Indian history.

The *Tazkirah-i-Salātīn-i-Chaghtāi* mentions several times one Nāhir Khān, a Shaikhzādah of Hānsi (1122 H., or A. D. 1710), who was Faujdār of Dholkha in Gujarāt and Dīwān of Ahmadābād. During the reign of Muhammad Shāh, Shahdād Khān Khweshagī was appointed Faujdār of Hānsi and Hisār, "which district from old times had been a bed of rebellion, and which, in consequence of the weakness of the government, had for some time paid nothing into the imperial treasury." Shahdād reduced the forts of the districts, and kept the rebels down. He chiefly employed men of his own clan.

The *'Imād-ussa'ādat* (Lucknow edit., p. 125) mentions that Muhammad Bashīr Khān received from Nawāb Najaf Khān Bahādūr the district of Hānsi and Hisār.

In the end of last century, Hānsi became for a short time (1798 to 1801) the capital of George Thomas, of Tipperary, whose short-lived kingdom comprised Hānsi, Hisār, Mahim, Bhadra, Sīdhmukh, Sīwānī, Behal, Jamālpūr, Toshām, Agrowah, Barwālā, and Jīnd, which, with several places he held of the Marāṭhas, yielded a revenue of 430,000 Rupees, the former revenue derived from the same places having been Rupees 2,010,000 (*vide* Franklin, *Memoirs of George Thomas*, p. 92). When Thomas chose Hānsi as his capital, the walls of the city had fallen into decay; and 'as the town had long been deserted', he had great difficulty in procuring inhabitants. By gentle treatment he collected about six thousand people. In the end of 1801, he was attacked by the Marāṭhas under Perron and had to surrender. In the middle of January, 1802, he was escorted to the British frontier. He intended to proceed towards Calcutta, in order to retire from public life. But death overtook him, on the 22nd August, 1802, at Berhāmpūr in Bengal, where he lies buried.

Of Hānsi celebrities I have to mention the following—

1. Shaikh Jamāl. He belongs to the great saints of India. He was a descendant of the renowned Abū Hanīfah of Kūfah. Shaikh Farīd-uddīn Ganj-i-Shakar of Ajodhan (Dīpālpūr) was his friend and lived with him for twelve years at Hānsi. From his oratorical powers, he was called 'Khaṭīb', the preacher, or Kuṭb-i-Khuṭṭāb, 'the pole star of preachers.' One of his treatises has the title of 'Mulhamāt.' He died in 659 H., or A. D. 1261, and lies buried at Hānsi.

2. Maulānā Mughīṣ (مغیث). He was a poet and flourished during the reign of Jalāl-uddīn Fīrūz Shāh II. (1290 to 1296, A. D.) Badāonī and the Haft Ikīm quote a few of his verses.\*

\* Those who delight in the subtleties of Persian Prosody will find the verse ascribed by Badāonī to Mughīṣ (*Bad.* I, 181) of interest. Badāonī says that Mughīṣ composed a whole *ghazal* that could be read in *nineteen* different metres! It is a pity that the MSS. which the editor of the Bibl. Indica edition had for collation, give a corrupt reading of the second hemistich. The first hemistich is—

دو در گوش و قد خوش دو خد خوب و خط تر  
12 11 10 9 8 7 6 5 4 3 2 1

The twelve words of this hemistich are all monosyllabic, and the 2nd, 5th, 8th, and 11th words have the *Izāfat*. But the *Izāfats* of the 5th and 11th words are not necessary, as *ast* may be supplied. Again the 2nd, 5th, 8th, 11th words may in Persian be read with or without the *Tushdīd*. Bearing this in mind, we get the following *nineteen* metres. (The numbers in brackets refer to the paragraphs in my 'Prosody of the Persians.')

#### I. *Hazaj*.

1. مفاعیل 4 times (14). 2. مفاعیل 4 times (16).

#### II. *Rajaz*.

3. مستفعیل 4 times (33). 5. مفتعلن مفاعیل 2 times (36).  
4. مفتعلن 4 times (35). 6. مفاعیل مفتعلن 2 times (37).  
7. مفتعلن مفاعیل مفتعلن (p. 37. l. 1.).

#### III. *Ramāl*.

8. فاعلاتن 4 times (41). 9. فعلاتن 4 times (43).  
10. فعلاتن فعلاتن 2 times (46).  
11. فاعلاتن فعلاتن فعلاتن فعلاتن (orig. form of 41).

#### IV. *Muzāra'*.

12. مفاعیل فاعلاتن 2 times, (orig. form of 67).

#### V. *Mujtaṣṣ*.

13. مستفعیل فاعلاتن 2 times (76). 14. مفاعیل فعلاتن 2 times (76).

#### VI. *Khafff*.

15. فاعلاتن مفاعیل فعلاتن مفاعیل (a *muṣamman Khafff*, p. 59 note).

In the above fifteen metres, the four *Izāfats* of the verse must all be read; but as two may be left out, we get—

#### VII. 'Arīz.

16. مفاعیل فعولن 2 times (105).

#### VIII. 'Amīq.

17. فاعلن فاعلاتن 2 times (106).

#### *Mujtaṣṣ Akhrab*.

18. مفعول فاعلاتن 2 times (67).

And if only the last of the four *Izāfats* be left out, we have—

#### *Rajaz*.

19. مفتعلن مفتعلن مفاعیل مفعولن (p. 38, 2nd line).

3. Shaikh Kūṭb-uddīn Munawwar, son of Burhān-uddīn, son of Shaikh Jamāl. He is as renowned a saint as his grandfather. He had been a disciple of Nizām-uddīn Auliya (the Dihlī saint), lived a retired life, and took no presents from kings. Muhammad Shāh Tughluq went personally to Hānsī, in order to induce him to come with him to Dihlī. The meeting took place at Bhainī (بهینی), near Hānsī, and is minutely related in the works on Indian Saints. Shaikh Kūṭb died in 760 H., (A. D. 1359), and lies buried at Hānsī.

4. Ghulām 'Alī Bhikan. He lived during the reign of Aurangzib, and compiled in 1113 H. (A. D. 1701) a Persian dictionary, entitled *Ashhar-ullughāt*.

5. 'Abdul-Wāsi'. His Persian grammar, entitled *Risālah-i-'Abdul-Wāsi* is read in every Madrasah in India. He also wrote in Persian an Urdū Dictionary of Technical (chiefly Agricultural\*) Terms, which he entitled *Gharāib-ullughāt*. This book, copies of which are very rare, was criticized by Sirāj-uddīn 'Alī Khān Arzū in his *Nawādir-ul-Alfāz*, likewise a rare Urdū Dictionary of Technical Terms. Sir H. Elliot used the latter work extensively for his 'Supplemental Glossary.'

I now proceed to give my readings and translations of Mr. Delmerick's rubbings.

### I.

From the Mīr Mīrān Sālārī Mosque, inside the fort of Hānsī. One line, 4 ft. 11 in. by 7 in. The characters are rude, but clear.

امربنا مسجد العبد علی بن اسفندیار فی عشر ذی الحجة سنه ثلث وتسعين  
و خمس مایه ۱۱

The slave [of God] 'Alī, son of Isfandiyār, ordered the building of this mosque on the 10th Zil-Hajjah, 593. [23rd October, 1197.]

If the last be looked upon as awkward, we may double the 'Arz, and thus get  
مفاعیل فاعولن 2 times.

If we had the whole ghazal, it is possible that we should have to modify one or two of the above 19 metres; but as it is, they suit the first hemistich.

The author of the *Haft Iklim* says that he knows nothing about Mughis, but he had often seen verses by him. He quotes the following (metro *Munsariḥ*, مفتعلن فاعلن)—

چاک کفد با بسے جیب به بستان حسن \* چون تو گلے گر کشد. سر ز گویدان حسن  
ماید لطف غیب شد چوبگیتی فراز. \* جای نمکدان نشست روی تو بوخوان حسن  
مملکت دلبری حجت اول نداشت \* داد نگینش کنون لعل تو از کان حسن

I have found in no other Tazkirah notices of this poet.

\* Hānsī appears to have once been held in high estimation for its agricultural progress. Even at present Hānsī cows are proverbial for their excellence.



This is the oldest Muhammadan inscription this side of Dihli, that I have seen.

## II.

From the Bú 'Alí Bakhsh Walí Mosque in the Mughalpárah Quarter of Hānsī. Two lines, 2 ft. 6 in. by 7 in. The characters are rude.

هذا عمارۃ المسجد العبد الضعیف احمد بن محمد اسمندى في المنتصف ربیع الآخر  
سنه ثلث والعشرين وستمائة ۱۱

This mosque was built by the weak slave Ahmad, son of Muhammad, of Asmand, in the middle of Rabī' II, 623. [Middle of April, 1226.]

Asmand is a small place near Samarqand.

## III.

Inscription from the Barsī (برسی) Gate in Hānsī, to the left of the entrance. Barsī is the name of a place S. of Hānsī. Three lines; 9 ft. 3 in. by 1 ft. 4 in. The same heavy characters as found on other inscriptions of 'Alá-uddín's reign. *Vide* Insr. VI.

بعہد مملکت بادشاہ روی زمین \* خدایگان سلاطین علاء دنیا و دین  
ابو المظفر شاہ جهان محمد شاہ \* کے باد مملکتش جاودان بروی زمین  
یگانہ خسرو گیہان سکندر ثانی \* رسیدہ صیت معالیہ ش تا بعلیین  
بنا نہادہ شد این بے نظیر دروازہ \* کز ارتفاع بکیوان ہمی کند تمکین  
بسمت حضرت دہلی کے ہست دار الملک \* \* \* \* \*  
\* \* \* \* \* سال ہفصد و سہ آمدہ عمارت این

1. In the time of the reign of the king of the face of the earth, the lord of princes, 'Alá-uddunyá-waddín,

2. Abul Muzaffar, the king of the world, Muhammad Sháh—may his kingdom be everlasting on the face of the earth!—

3. The unrivalled, the master of the world, the second Alexander, the fame of whose great deeds has reached the highest heaven,

4. This gate which has no equal was erected and is from its height an honor to Saturn [the keeper of the seventh heaven],

5. On the road to Dihli, the king's residence, which is the capital of the kingdom, \* \* \* \* \* this strong fort [of Hānsī]

6. \* \* \* \* \* in the year 703 the edifice was erected. [A. D. 1303-4.]

No doubt, 'Alá-uddín fortified Hānsī as an outpost against the Mughuls.

## IV.

From the Díní Mosque in the town of Hānsī, near the Saráogyán Mandir. Three lines, 2 ft. 9 in. by 1 ft. 4 in.

بتوفیق خدای عالم و برکت مصطفی علیہ السلام در عہد دیہون و دولت ہمایون  
خدایگان عالمشاہ بادشاہ اسلام راہی الانام فیروز شاہ السلطان خلد اللہ ملکہ و سلطانہ

بندۀ درگاه ساهن سلطانی بتاريخ غرة ذي القعدة سنة سبع وستين و سبعمائة اين  
مسجد بنا کرد //

By the grace of God the omniscient and the blessing of the chosen Prophet (upon whom be peace!), in the auspicious time and the august reign of the Lord, the king of the world, the king of Islām, the shepherd of the people, Fīrūz Shāh the king (may God perpetuate his kingdom and rule!), this mosque was erected by the slave of the throne Sāhān the Royal, on the 1st Zī Kā'dah, 767. [10th July, 1366.]

## V.

From the Kuṭb Sāhib's Mosque, near the Dargāh of the four Kuṭbs, or saints, outside Hānsí, about forty paces from the Hānsí road. Eight lines, 2 ft. 7 in. by 11 in. Rude and indistinct characters.

الله الملك

بتوفیق الله تعالی بنده درگاه سبحانی ابا بکر بام جاوانی که یک از مریدان پیر دستگیر  
سلطان المشایخ شیخ ابوالفتح قدس الله سره العزیز است در پایان قطب اقطاب عالم  
شیخ جمال الحق والشرع والدين طاب ثراه و جعل الجنة مثواه و نور الله مرقده  
در وقت جلوس سجاده بندگی سلطان المشایخ شیخ فرید مد الله عمره این مسجد را  
بنا کنانید - هر که درین مسجد نماز بگذارد بدعای \* \* \* یاد کند \* کاتب حروف رضی  
قطب نایب قاضی هانسی محله \* \* \* شحنة \* \* \* الخامس و العشر من صلا رجب  
رجب قدره سنة ست و تسعين و ثمانمائة سنکدرایش امین بن \* \* \* گوری //

God is the King!

By the grace of the great God, the slave of the throne of the Almighty, Abā Bakr Bāmjawānī, who is one of the disciples of the helping spiritual guide, the king of Shaikhs, Shaikh Abul-Fath (may God sanctify his dear secret!), had this mosque erected near the pole of the poles of the world, Shaikh Jamāl-uddīn (may the earth of his grave be perfumed, may God make paradise his mansion, and may God illuminate his resting-place!), at the time when the worshipful king of Shaikhs, Shaikh Farīd (may God lengthen his life!) succeeded as the spiritual ruler. He who reads a prayer in this mosque, should remember (the builder) with a pious wish.

The writer of these lines is Razā Kuṭb, the representative of the Qāzī of Hānsí in Mahallah \* \* \* \* police inspector \* \* \* \* on the 15th Rajab (may the honor of the month increase!) of the year 896. The engraver is Amīn, son of \* \* \* Gorī. [24th May, 1491.]

On the top, to the left of the words 'God is the King', in small characters—

در عهد بادشاه زمان سکندر شاع بن بهلول شاع سلطان خلد الله ملکه و سلطانه //

In the time of the king of the age, Sikandar Shāh, son of Buhlūl Shāh, the king, may God perpetuate his kingdom and rule!

I do not know what 'Bāmjawānī' is. If the ā in the second syllable were not long, I would read 'Abā Bakr nām jawāné,' a young man named Abā Bakr.

## VI.

The following inscription is from the Barsí gate, to the right of the entrance. *Vide* above Inscr. III. Five lines, 1 ft. 2 in. by 1 ft. 6 in. The letters are chipped in places.

بناء عمارت این دروازه متین با برمت علوی حصن حصین علائی که مؤرخست سنه  
اثنی و سبعماية در عهد سلطان السلاطین ابوالمظفر ابراهیم شاه سلطان خلد الله ملکه  
و سلطانہ در عمل مسند عالی حمید خان بانتخاب کامل و در شقداری خواجه محمد  
و بفرمایش \* \* \* \* \* فی الخامس من شهر ذی القعدة سنه ثمان و عشرين  
و تسعمائة كاتب خانزاده نصر مفتی هانسوی ||

The building of the edifice of this gate, together with the repairs of the upper strong fort built by 'Alá-uddín, which is dated 702 H., was \* \* in the reign of the king of kings Abul Muzaffar Ibráhim Sháh the king, may God perpetuate his kingdom and rule!—during the governorship of the Masnad-i-'álí Hamíd Khán, with perfect choice, and during the *shiké-dárf* of Khwájah Muhammad, and by order of \* \* \* on the 5th Zí Ka'dah, 928. The writer is Khánzádah Naçr, Muftí of Hánsí. [26th September, 1522.]

The correct year of the erection of 'Alá-uddín's fortification is 703 H., as given in Inscr. III.

## VII.

From a Mosque near the Mirán Sálári Mosque. The stone is white marble and the letters are black and inlaid. Mr. Delmerick sends the following reading—

سجدت لك شكرا و حمدا خادم الفقراء حسن رضا إحداث نمود ۱۰۹۷ هجری ||

I prostrate myself before Thee in thanks and in praise. The servant of the poor Hasan Razá erected it. 1097 H. [1686, A. D.]

The following papers were read—

1. *Note on a Copper-plate Grant from the Cuttack Collectorate.*—By  
BÁBU RANGALÁL BANERJEA.

(Abstract.)

The plates were found in the muniment room of the Cuttack Collectorate, but there is no record to show whence they came and to whom they belong. Probably they had been submitted as a document in support of a claim for some rent free land when the Province of Orissa was first settled at the beginning of this century, but were never after taken away, the object of the owner having been defeated owing to the absence of a person who could decypher the document. The inscription records the grant of a village named Chandra in the fiscal division of Marāḍa in the province of Dakshine Kosala, which has been identified with the modern village of Chandrá in Marāḍa Hariharpur in the neighbourhood of Cuttack. The donor was

Yajāti the founder of the Kesarī dynasty, who expelled the Buddhists and re-established Hinduism in Orissa about the close of the 5th century. Hitherto he has been supposed to have been an independent sovereign; but in the patent under notice he owns allegiance to Bhava Gupta of Magadha, and hence it would seem that it was a Hindu king of Magadha who overthrew the Buddhist sovereignty of Orissa and held the province as a dependency through a vassal. In the Temple records of Puri, the Buddhists are represented as Yavanas.

A Photozincograph will accompany the paper, which will appear in No. II of this year's Journal.

2. *On the Route between Sohár and el-Bereymí in 'Omán, with a note on the Zaṭṭ, or gypsies, in Arabia.*—By COLONEL S. B. MILES, *Masḳat.*

(Abstract.)

Colonel Miles describes the route from Sohár on the Persian Gulf, north of Masḳat, across the Jabal Akhdhar Range to el-Bereymí on the outskirts of the southern Arabian Desert. He refers to the antiquities of the coast, which before the spread of Islám was held by the Persians, and gives interesting notes on the places he passed, the customs of the people, the scenery and produce of the country, and the geology and fauna of the mountain tracts. A map accompanies the essay.

The paper concludes with a notice of the Zaṭṭ, or gypsies, of Arabia, whom Dr. Sprenger identifies with the Jats of India. They are at once distinguishable from the Arabs as a distinct race, and are numerous in Arabia. They are accomplished handicraftsmen, and are to the natives of the interior what the banians are in the seaport towns. They speak among themselves, as elsewhere, a gibberish of their own manufacture, the plan being to prefix to Arabic words the letter *m* and to suffix the syllable *eeḳ*; thus the Arabic *ḵamar*, 'moon', becomes *mḵámareek*.

The paper will be shortly published in No. 1, Pt. I, of the Journal, for 1877.

MR. BLOCHMANN said—Several of the Zaṭṭ words given by Colonel Miles are corruptions of Arabic words; but some have no Arabic sound. The word for 'father' *bweieḳee*, looks like the diminutive of *ab*, father, with the ending *ee*; other words as *fidúmeḵ* (rice), *jarráḵuḵ* (knife) are Arabic, but have in classical Arabic only kindred meanings.

It would be of interest to have the Zaṭṭ numerals, provided they do not use, when speaking among themselves, the Arabic numerals.

MR. W. T. BLANFORD said that Col. Miles's paper referred to a region of great interest, but of which very little was known. It was visited by Lieut. Wellsted, of the Indian Navy in 1835, and briefly described by him

in the Journal of the Royal Geographical Society for 1837, (Vol. VII. p. 102) and also in his "Travels in Arabia." Both Zoology and Geology require investigation. Mons. Aucher Eloy, a French botanical collector, visited the Muscat hills about 1837, and brought away specimens of a few animals, but his collections were small and imperfect. The hills look from Muscat as if they consisted partly of the dark limestone which forms the headland of Mussendom at the entrance to the Persian Gulf. Some fossils from this limestone were examined by Dr. Stoliczka and found to be Triassic.

### LIBRARY.

The following additions have been made to the Library since the Meeting held in April last.

### TRANSACTIONS, PROCEEDINGS, AND JOURNALS,

*presented by the respective Societies or Editors.*

Bombay. The Indian Antiquary,—Vol. VI, Pt. 66, 1877.

*J. F. Fleet.*—Sanskrit and Old Canarese Inscriptions. *C. Horne.*—Paper-making in the Himálayas. *W. F. Sinclair.*—Notes on the Cave of Panchalesvara in Mouje Bhamburda, Táluká Haveli, Zillá Puná. *Rev. F. Kettel.*—Three Kongu Inscriptions.

Calcutta. Geological Survey of India,—Memoirs, Ser. II. 2.

*Dr. O. Feistmantel.*—Jurassic (Liassic) Flora of the Rajmahal group, in the Rajmahal Hills.

London. The Athenæum,—Nos. 2578, 2579, 2580—1877.

———. Nature,—Vol. 15, Nos. 386, 387, 388—1877.

Palermo. Società degli Spettroscopisti Italiani,—Memorie, Dispensa 2, Febbraro, 1877.

Paris. La Société de Géographie,—Bulletin, Février, 1877.

*L'Abbé Desgodins.*—De Yerkalo à Tsé-Kou (avec carte dans le texte).

Washington. Smithsonian Contributions to Knowledge,—Vols. XX, XXI.

Vol. XX. *Dr. J. H. Coffin.*—The Winds of the Globe; or the Laws of Atmospheric Circulation over the Surface of the Earth.

Vol. XXI. *Dr. S. Alexander.*—Statement and Exposition of Certain Harmonies of the Solar System. *S. Newcomb.*—On the general Integrals of Planetary Motion. *J. G. Swan.*—The Haidah Indians of Queen Charlotte's Islands, British Columbia: with a brief Description of their Carvings, Tatoo Designs, &c. *C. A. Schott.*—Tables, Distribution, and Variations of the Atmospheric Temperature in the United States, and some Adjacent parts of America.

Yokohama. Deutsche Gesellschaft für Natur und Völkerkunde Ostasien's, —Mittheilungen, Heft. 9—11, 1876.

## BOOKS AND PAMPHLETS

*presented by the Authors.*

CLARKE, HYDE. Serpent and Siva Worship and Mythology in Central America, Africa and Asia. Pamphlet.

MASON, E. MRS. The Mountain Karen Colony in Toungoo, Burma. Pamphlet.

MOREHEAD, C. DR. (Ed.) Memorials of the Life and Writings of the Rev. Robert Morehead. 8vo., Edinburgh 1875.

UDOY CHUND DUTT. The Materia Medica of the Hindus. Compiled from Sanscrit Medical Works. 8vo., Calcutta, 1877.

## MISCELLANEOUS PRESENTATIONS.

Selections from the Records of the Govt. of India, Home Dept., No. 133. Reports on Publications issued and registered in the several Provinces of British India, during 1874.

HOME DEPT., GOVT. OF INDIA.

Report on the Judicial Administration (Civil) in the Central Provinces for 1876.

THE CHIEF COMMISSIONER CENTRAL PROVINCES.

The Mahābhārat, Vol. 1, No. 4.

THE EDITOR.

The Sarvarthadāyīnī, Vol. 1. No. 1.

THE EDITOR.

The Rāmāyana, No. 6, Pt. 1.

THE EDITOR.

## PERIODICALS PURCHASED.

Bombay. The Vedārthayātna, or an attempt to interpret the Vedas, Pt. 1, No. 1.

Calcutta. Stray Feathers, Vol. V, No. 1, 1877.

Leipsic. Beiblätter zu den Annalen der Physik und Chemie. Band 1, Stück 2—3.

Stück 2. *O. W. Siemens.*—Ueber die Bestimmung der Meerestiefe mittelst des Bathometers ohne Anwendung des Senkbleies. *Graeff.*—Ueber eine Reihe von Versuchen über den Ausfluss des Wassers, die am Reservoir des Furens angestellt worden sind.

Göttingen. Göttingische Gelehrte Anzeigen,—Stück 9—13, 1877.

Stück 9. *N. Prshevolski.*—Die Mongolei und das Land der Tanguten; eine dreijährige Reise im östlichen Hochasien.

———. ———. Nachrichten,—Nos. 4—8, 1877.

London. The Academy,—Nos. 255—257, 1877.

———. The Chemical News,—Vol. 35, Nos. 904 and 906, 1877.

No. 906. Alleged discovery of a new Metal. *J. W. Langley*.—On the Relationship of Structure, Density and Chemical Composition of Steel.

———. The Journal of the Society of Arts, Vol. 25, Nos. 1270—1272.

No. 1270. *Dr. G. Birdwood*.—The Native Press of India.

Paris. Annales de Chimie et de Physique,—5<sup>me</sup> Série, Tome 10, Mars, 1877.

*J. Violle*.—Mémoire sur la température moyenne de la surface du soleil. *M. Leclanché*.—Du rôle du peroxyde de manganèse dans les piles électriques, nouvelle pile au peroxyde de manganèse.

———. Comptes Rendus,—Tome 84, Nos. 11—13, 1877.

No. 12. *MM. Becquerel et E. Becquerel*.—Observations de température faites au Muséum d'Histoire naturelle pendant l'année 1876 avec des thermomètres électriques placés à des profondeurs de 1 mètre à 36 mètres sous le sol, ainsi que dans l'air et sous des sols gazonnés et dénudés.

No. 13. *M. Pasteur*.—Note au sujet d'une communication récente de *M. Weddell*, concernant l'avantage qu'il y aurait à remplacer la quinine par la cinchonidine. *Ph. Van Tieghem*.—Sur la digestion de l'albumen.

———. Journal des Savants, Mars, 1877.

*B. Saint-Hilaire*.—Kaccáyana.

———. Revue Scientifique, Nos. 37, 39—40, 1877.

No. 40. *E. Naville*. Théorie de la vision.

## BOOKS PURCHASED.

FALLON, S. W. Dr. A new Hindustani-English Dictionary, Pt. VII.

PREJEVALSKY, Lieut.-Colonel N. Mongolia, the Tangut Country, and the solitudes of Northern Tibet being a narrative of three years travel in Eastern High Asia. Translated by E. D. Morgan, with introduction and notes by Col. H. Yule, C. B. 2 Vols. Royal 8vo., London, 1876.

AGASSIZ, Prof. L. Bibliographia Zoologiae et Geologiae. A General Catalogue of all Books, Tracts, and Memoirs, on Zoology and Geology. Corrected, enlarged and edited by H. E. Strickland. 4 Vols. 8vo., London, 1848. (*Ray Society*.)

ALLMAN, G. J. Dr. A Monograph of the Gymnoblatic or Tabularian Hydroids. Pts. I. II. Royal 4to. 1871-2. (*Ray Society*.)

———. A Monograph of the Fresh-water Polyzoa, including all the known species both British and Foreign. Royal 4to. London, 1856. (*Ray Society*.)

BAIRD, W. Dr. The Natural History of the British Entomostraca. 8vo., London, 1850. (*Ray Society*.)

BLACKWALL, J. A History of the Spiders of Great Britain and Ireland. Pts. I and II. Royal 4to. London, 1860-4. (*Ray Society*.)

- BOWERBANK, J. S. A Monograph of the British Spongiadæ. 3 Vols. 8vo., London, 1846-74. (*Ray Society*.)
- BROWN, R. The Miscellaneous Botanical Works of. Vols. 1, 2. Text. Vol. 3, Atlas of Plates. 8vo., London, 1846-47. (*Ray Society*.)
- BUCKTON, G. B. Monograph of the British Aphides, Vol. 1. 8vo., London, 1876. (*Ray Society*.)
- BURMEISTER, H. Dr. The Organization of Trilobites, deduced from their living affinities, with a systematic Review of the Species hitherto described. Edited from the German by Professor Bell and Professor E. Forbes. Royal 4to., London, 1846. (*Ray Society*.)
- DARWIN, CHARLES. A Monograph of the sub-class Cirripedia, with figures of all the species. 2 Vols. 8vo., London, 1851. (*Ray Society*.)
- DOUGLAS, J. W. and J. SCOTT. The British Hemiptera. Vol. 1. Hemiptera—Heteroptera. 8vo., London, 1845. (*Ray Society*.)
- FLOWER, W. H. (Ed.) Recent Memoirs on the Cetacea. By Professors Eschricht, Reinhardt and Lilljeborg. Royal 4to. London, 1864. (*Ray Society*.)
- FORBES, E. A Monograph of the British Naked-eyed Medusæ with figures of all the Species. Royal 4to., London, 1848. (*Ray Society*.)
- HENFREY, ARTHUR. (Ed.) Botanical and Physiological Memoirs, consisting of—

*Braun, Dr. A.*—The Phenomenon of Rejuvenescence in Nature, especially in the life and development of Plants.

*Cohn, Dr. F.*—An abstract of the Natural History of *Protococcus Pluvialis*.

*Meneghini, Professor G.*—On the Animal Nature of the *Diatomeæ*, with an organographical revision of the genera established by Kützinger.

8vo. London, 1853. (*Ray Society*.)

- . Reports and Papers on Botany, consisting of—

*Grisebach's* Report on Geographical Botany for 1844.

*Grisebach's* Report on Geographical and Systematic Botany for 1845.

*Link's* Report on Physiological Botany for 1844-45.

*Mohl* on the Structure of the Palm-stem.

*Nägeli* on the Utricular Structures in the contents of cells.

*Nägeli* on Vegetable cells.

8vo. London, 1849. (*Ray Society*.)

- HOFMEISTER, Dr. W. On the Germination, Development and Fructification of the Higher Cryptogamia, and on the fructification of the Coniferae. Translated by F. Currey. 8vo., London, 1862. (*Ray Society*.)
- LANKESTER, E. Dr. The Correspondence of John Ray: consisting of Selections from the philosophical letters published by Dr. Derham and original letters of John Ray in the collection of the British Museum. 8vo., London, 1846. (*Ray Society*.)
- LANKESTER, E. Dr. Memorials of John Ray, consisting of his life by Dr. Derham: Biographical and critical notices by Sir J. E. Smith and Cuvier,



- and Dupetit Thouars, with his Itineraries etc. 8vo., London, 1846. (*Ray Society.*)
- LEIGHTON, REV. W. A. The British Species of Angiocarpous Lichens, elucidated by their Sporidia. 8vo., London, 1851. (*Ray Society.*)
- LUBBOCK, SIR JOHN. Monograph of the Collembola and Thysanura. 8vo., London, 1873. (*Ray Society.*)
- MASTERS, M. T. Vegetable Teratology. An account of the principal Deviations from the usual Construction of Plants. 8vo., London, 1869. (*Ray Society.*)
- McINTOSH, W. C. A Monograph of the British Annelides, Pt. 1. The Nemertean. Royal 4to., London, 1873. (*Ray Society.*)
- MEYEN, F. J. F. Dr. Outlines of the Geography of Plants; with particular enquiries concerning the native country, the culture, and the uses of the principal cultivated plants on which the prosperity of nations is based. Translated by Margaret Johnston. 8vo., London, 1846. (*Ray Society.*)
- OKEN, LORENZ, Dr. Elements of Physiophilosophy. Translated from the German by A. Tulk. 8vo., London, 1857. (*Ray Society.*)
- PARKER, W. K. A Monograph on the Structure and Development of the Shoulder-Girdle and Sternum in the Vertebrata. Royal 4to., London, 1848. (*Ray Society.*)
- Reports and Papers on Botany consisting of—
- Grisebach, Prof.* On Botanical Geography. Translated by H. B. Macdonald, and G. Busk.
- Link, Dr. H. T.* Report on Botany. Translated by J. Hudson.
- Nägeli, C.* On Vegetable cells. Translated by A. Henfrey.
- Zuccarini, Dr.* On the Morphology of the Coniferae. Translated by G. Busk.
- 8vo. London, 1846. (*Ray Society.*)
- Reports on the Progress of Zoology and Botany 1841-42. 8vo., London, 1845. (*Ray Society.*)
- Reports on Zoology for 1843-44. Translated from the German by G. Busk, A. Tulk, and A. H. Haliday. 8vo., London, 1847. (*Ray Society.*)
- SCLATER, P. L. (Ed). Nitzsch's Pterylography. Translated from the German. Royal 4to., London, 1847. (*Ray Society.*)
- STEENSTRUP, JOH. JAPETUS SM. On the Alternation of Generations; or the propagation and development of animals through alternate generations, Translated from the German version of C. H. Lorenzen, by G. Busk. 8vo., London, 1845. (*Ray Society.*)
- WILLIAMSON, W. C. On the Recent Foraminifera of Great Britain. Royal 4to., London, 1858. (*Ray Society.*)
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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JUNE, 1877.

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The Monthly General Meeting of the Asiatic Society was held on Wednesday, the 6th April, at 9 P. M.

W. T. BLANFORD, Esq. F. R. S., Vice-President, in the chair.

The following presentations were announced :—

1. From Colonel S. B. Miles, Political Agent, Muscat, the Prithví Ráj Rasau of Chand, and another MS.

The CHAIRMAN drew attention to the valuable nature of Col. Miles' gift, and said that the Council proposed that the special thanks of the Society should be given to Col. Miles for it. The proposal was put to the vote and carried unanimously.

2. From Mr. W. Theobald, a copy of his "Catalogue of the Land and Fresh-water Shells of British India."

3. From the Trustees of the Indian Museum, a copy of a Monograph of the Asiatic Chiroptera and Catalogue of the species of Bats in the Collection of the Indian Museum, Calcutta, by Dr. G. E. Dobson.

4. From Capt. J. Waterhouse, a Map of Turkey in Europe and the Black Sea, with the adjoining parts of Russia and Turkey in Asia.

5. From the Rev. C. H. A. Dall, "Scientific Results of the exploration of Alaska," Vol. I.

6. From Dr. Rájendralála Mitra, a copy of the Káyastha Kaustubha, by Rájnáráyan Mitra.

7. From Dr. A. F. Bradshaw, copies of the following works :

The Travels of Guru Tegh Bahádur and Guru Gobind Sing. By Sirdár Attar Sing.

Sakhee Book, or the Description of Guru Gobind Singh's Religion and Doctrines. By Sirdár Attar Sing.

The Rayhit Nama of Pralád Rái.

8. From the Secretary to the Government of Bombay, a copy of Inscriptions from the Kudá Caves taken by Mr. J. Burgess, Archæological Surveyor and Reporter to the Government.

The following gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected Ordinary Members :—

Mr. H. K. W. Arnold, the Maharájá of Darbhanga, Mr. A. W. Croft, (re-election).

The following is a candidate for ballot at the next meeting :—

Nawáb Asghar 'Alí Khán, Dilír Jang Bahádur, C. S. I., proposed by Dr. Rájendralála Mitra, seconded by Capt. J. Waterhouse.

The SECRETARY laid before the Meeting a communication from Mr. W. McGregor on the subject of Lightning Conductors, accompanied by a copy of the following circular and memorandum of the British Association Committee on Atmospheric Electricity and Lightning-Rods.

"The Committee charged with this investigation and report desires to have as much information as possible regarding accidents from lightning. But in order that information of this class may possess scientific value, it is essential that all statements communicated should be clearly and definitely expressed, that they should be carefully authenticated, and that the address, as well as the name, of the observer should be given, to allow any further inquiry to be instituted that may be found to be desirable in the circumstances. The Committee has consequently drawn up the following memorandum to define the nature of the information it seeks, and earnestly requests that any person who may chance to know of accidents from lightning, or who may be able to give practical assistance in this inquiry, in the sense and particulars suggested by the memorandum, will address such communications, as they may be in a position to make on these subjects, to the Chairman of the Permanent Committee on Atmospheric Electricity and Lightning-rods. Meteorological Society, 30, Great George Street, Westminster, London."

*Memorandum of information required in any case of Accident  
from Lightning.*

1. The day, hour, and place of the occurrence.
2. The exact nature of the occurrence, especially specifying any unusual appearance or sound that has attended the discharge of lightning.
3. A minute and precise description of any damage that may have been produced by the discharge.
4. Record of any visible traces of electrical action that may have been left in the track of the discharge.
5. (The names and addresses of any person who may have witnessed

the actual discharge producing damage, or who may have suffered in any way from its effects.

6. The existence or non-existence of a lightning-rod in any form in the immediate neighbourhood of the accidents, and an exact description of the rod when any such appendage has been ascertained to be near, especially as to—

- (a) the nature of the metal of which the rod is composed :
- (b) the size of the rod :
- (c) the character of the conductor, whether it has the form of a solid cylinder, of a tube, of a flat strip, of a chain, or of a wire-rope :
- (d) the actual continuity of the conductor from end to end :
- (e) the character of the termination above, and the distance to which it extends there beyond any building or solid structure :
- (f) the character of the termination below, whether in dry or moist ground, how it runs into the ground, and how the earth-contact is ultimately made :
- (g) the manner in which the conductor is connected with any building, and especially whether there are any masses of metal in the building near, and whether such masses are or are not placed in metallic communication with the conductor.

7. Allusion to the fact whether the injurious discharge did or did not form part of an ordinary thunder-storm in progress at the time.

8. In case of the occurrence of a thunder-storm in progress at the time of the discharge, a description of the character of the storm as to intensity, duration, fall of rain, and apparent movement over the locality.

9. Any subsidiary or incidental observations that may have been made and that may seem to bear practically upon the physical conditions and circumstances of the phenomenon.

Messrs. H. F. Blanford and Eliot have expressed their readiness to investigate, when practicable, cases of accidents from lightning occurring in Calcutta, and information on cases occurring there or in other parts of India may be sent to them at the Meteorological Office, Calcutta, or to Mr. W. McGregor, River View, Dhubri, Assam.

The CHAIRMAN announced that Mr. J. C. Douglas had been appointed a Member of the Physical Science Committee, Mr. H. B. Medlicott of the Library Committee, and Mr. W. T. Blanford of the Finance Committee.

Also that on the recommendation of the Library Committee, the Council had passed an order that not more than two MSS. should be lent out at a time to the same person, except with the sanction of the Council.

Also that on the recommendation of the Natural History Committee, the Council had sanctioned the publication of Mr. Moore's Descriptions of the

new Species of *Lepidoptera* found in the late Mr. Atkinson's Collection, as a separate work in quarto form, to be brought out in fasciculi as funds permit.

Also that on the recommendation of the Library Committee, the Council had sanctioned the appointment of a special assistant under Mr. Blochmann for the preparation of the Library Catalogue.

The following papers were read :—

1. *On the Diameter of the Wire to be employed in winding an Electromagnet in order to produce the Maximum Magnetic Effect.* By R. S. BROUGH.

In 1866 Mr. Schwendler investigated the best galvanometer resistance to employ in testing with Wheatstone's Bridge, a question which was previously involved in complete obscurity, some physicists arguing that since near balance the current passing through the galvanometer approaches the indefinitely small, therefore the number of convolutions, and hence the the resistance, of the galvanometer ought to be indefinitely great.\*

I may here remark that Count du Moncel in a communication to the Academy of Sciences has unjustly criticized Mr. Schwendler's method of treating the subject of electromagnets.† The latter supposed the dimensions of the bobbins (as I, also, do in this paper) to be given, fixed, and immutable; while the learned Count starts with varying the depth of the bobbin, and piques himself on getting a larger magnetic effect out of it than Mr. Schwendler did. The best thickness of wire to wind on a given bobbin, and the best size and shape of bobbin to employ for a given purpose, are two totally distinct questions.

While investigating the above problem, the question of the influence of the insulating covering of the wire on the results occurred to Mr. Schwendler, and he went into it in a subsequent paper.‡

Mr. Schwendler attacked the problem from the point of view of the resistance of the bobbin; but it seems to me that it yields more readily, and presents a more definite result (the former method gives an equation of the 4th order, which has to be solved by a rather coarse approximation) when we start from the thickness of the wire. This method has also led me to a singularly simple relation existing between the resistance of the electromagnet and the external resistance.

I shall take the case of an elongated bobbin with straight sides and circular ends, because this is a very common form to give to galvanometer coils, and because the results can at once be reduced to those applicable to

\* Philosophical Magazine, May, 1866.

† Comptes Rendus, Vol. LXXVI, pp. 368-371.

‡ Philosophical Magazine, January 1867.

circular bobbins by simply putting the length of the sides equal to nothing in the various expressions.

Let  $Y$  = the magnetic effect of the bobbin

$R$  = „ resistance „ „

$S$  = „ external resistance.

$E$  = e. m. f. of the battery.

and  $n$  = the number of convolutions.

Then (Jacobi and Dub)

$$Y = \frac{n E}{R + S}$$

and the problem is to make  $Y$  a maximum,\* treating the diameter of the wire with which the bobbin is wound as the independent variable, of which  $n$  and  $R$  are known functions.

Let  $A$  = the outer diameter of the circular ends

$a$  = „ inner „

$b$  = „ length of the bobbin

$c$  = „ „ „ straight sides between the circular ends

$\delta$  = „ diameter of the wire

$\rho$  = „ radial thickness of the insulating covering

and  $L$  = the length of the wire on the bobbin

$$\text{Then, } n = \frac{b (A - a)}{2 (\delta + 2\rho)^2}$$

for each wire being allowed a square, the length of whose sides is equal to the diameter of the covered wire: and

$$L = \frac{b (A - a)}{2 (\delta + 2\rho)^2} \left\{ \frac{\pi (A + a)}{2} + 2c \right\}$$

But

$$R = \lambda \frac{4 L}{\pi \delta^3}$$

where  $\lambda$  is the specific resistance of the conducting material of the wire, *i. e.* the resistance between opposite faces of the unit cube of the conducting material.

Therefore

$$R = \frac{\lambda b (A - a)}{\pi \delta^3 (\delta + 2\rho)^2} \left\{ \pi (A + a) + 4c \right\}$$

We had

$$Y = \frac{n E}{R + S}$$

\* The force exerted by a coil on a steel magnet is proportional to  $Y$ , whereas the force exerted on a soft iron armature is proportional to  $Y^2$ , but whatever value of the variable makes  $Y$  a maximum, will also make  $Y^2$  a maximum, so the one solution meets both cases.

$$\text{Put} \quad \theta = \frac{1}{Y}$$

$$\text{Then} \quad \theta = \left( \frac{R}{n} + \frac{S}{n} \right) \frac{1}{E}$$

and it is required to make  $\theta$  a minimum with respect to  $\delta$ .

$$\text{Now} \quad \theta = \left( \frac{\lambda}{\pi \delta^2} \left\{ \pi (A + a) + 4c \right\} + \frac{(\delta + 2\rho)^2 S}{b (A - a)} \right) \frac{2}{E}$$

$$\frac{d\theta}{d\delta} = \left( -\frac{\lambda}{\pi \delta^3} \left\{ \pi (A + a) + 4c \right\} + \frac{(\delta + 2\rho)^2 S}{b (A - a)} \right) \frac{4}{E}$$

$$\text{and} \quad \frac{d^2\theta}{d\delta^2} = \left( \frac{3\lambda}{\pi \delta^4} \left\{ \pi (A + a) + 4c \right\} + \frac{S}{b (A - a)} \right) \frac{4}{E}$$

$$\text{Putting} \quad \frac{d\theta}{d\delta} = 0, \text{ we have}$$

$$\delta^2 (\delta + 2\rho) = \frac{\lambda b (A - a)}{\pi S} \left\{ \pi (A + a) + 4c \right\}$$

which equation expresses implicitly the value of  $\delta$  which makes the magnetic effect a maximum.

Let us put  $\frac{\rho}{\delta} = \mu$ , then

$$\delta = 4 \sqrt{\frac{\lambda b (A - a)}{\pi (1 + 2\mu) S} \left\{ \pi (A + a) + 4c \right\}}$$

This expression for  $\delta$  contains  $\mu$ , itself a function of  $\delta$ ; but a very simple artifice suffices to get over this difficulty. First suppose  $\mu = 0$ , and solve the equation: the result will be an approximate value of  $\delta$ , namely, that which it would have, were there no insulating covering to the wire.

Then employing this approximate value of  $\delta$ , calculate  $\mu = \frac{\rho}{\delta}$ ; and recalculate the value of  $\delta$ , using this value of  $\mu$ .

By repeating this process, which involves very little trouble if logarithms be employed, any desired degree of accuracy may be attained.

From the above expression for  $\delta$  we see that, so long as  $\mu \neq 0$ , the diameter of the wire (without its covering) will always be *less* than it would be were there no insulating covering.

The expression for the resistance of the bobbin may be written

$$R = \frac{\lambda b (A - a)}{\pi \delta^2 (1 + 2\mu)} \left\{ \pi (A + a) + 4c \right\}$$

and supplying its value for  $\delta^2$ , we find

$$R = \frac{1}{1 + 2\mu} S$$

from which it is seen that, so long as  $\mu \neq 0$ , the resistance of the bobbin

must always be *less* than the external resistance. Putting  $\frac{\rho}{\delta}$  for  $\mu$ , we have

$$R = \frac{\delta}{\delta + 2\rho} S$$

which expresses the physical law, namely, that

$$\frac{\text{Resistance of bobbin}}{\text{External resistance}} = \frac{\text{Diameter of bare wire}}{\text{Diameter of covered wire}}$$

2. *Remarks on Mr. Campbell's Paper on Himalayan Glaciation in the Journal of the Asiatic Society of Bengal, Pt. II, No. 1, 1877. By W. THEOBALD, Geological Survey of India. Communicated by MR. H. F. BLANFORD.*

As Mr. Medlicott in his note to Mr. Campbell's paper has termed it a refutation of my views on the ancient moraines of the Kangra district, I would beg to say a few words in arrest of judgment on this point and to show wherein Mr. Campbell has not only failed to controvert my position but even to grasp its cardinal features.

I do not propose to introduce any new matter in support of my own views but to confine myself to Mr. Campbell's criticism and the more clear explanation of my own position, which I regard as not materially weakened by anything my critic has adduced.

Mr. Medlicott, it is true, does not go the length that I do as regards the extension of glaciers formerly into the Kangra valley, and it is superfluous to admit the weight which such an opinion should carry, but the difference between us is one more of degree than anything else, and if I am not mistaken, Mr. Medlicott differs in an opposite direction no less from Mr. Campbell than from myself.

On the other hand, Mr. H. F. Blanford in the discussion on Mr. Campbell's paper spoke of glacial action so low as 4500 feet, which goes far to bridge over the gulf which separates my estimate of the former limits of glaciers in Kangra from the more restricted estimate currently held on the subject.

As for whether or no these glaciers protruded into the lower grounds ten miles or so, either beyond or within the general limits assigned to them by me, is, in view of their stupendous development, a matter of little importance, and neither under present conditions, either easy to settle or worth contending for, the main question being, did glaciers, during later tertiary times or more recently, descend in Northern India to so low a level as 2000 feet above the sea?

Much that I have seen since fully corroborates this view, and it only remains to glance at the arguments which Mr. Campbell has adduced against it.



Mr. Campbell evidently relies much on the weight which should attach to his extended experience and special study of glacial phenomena, but his remarks show that he has overlooked the most important elements in a comparison between the glaciated districts of Europe and the Himalayan region—*viz.*, the difference in the character of the rocks and the prodigious disparity of denudational action in the two regions. It is true he appeals to the latter in the form of floods as the motive power by which the Kangra erratics have been torn from the distant peaks and scattered over the plains, but wholly loses sight of it, when insisting on the absence of striated rocks and other surface indications relied on in Europe to establish the former extension of glaciers. The two arguments are mutually destructive, for a succession of such terrific debacles as could alone have effected the transportation of blocks up to 140 feet in girth, could have had no other effect than to obliterate all traces of the ice plough, on the absence of which Mr. Campbell relies to disprove the extension of the old glaciers.

Again, from the weight which Mr. Campbell attaches to the absence of striation in the rocks of the Kangra district, it is clear that he has failed to recognise the very obvious fact, that the rock (a granitoid gneiss) which has afforded the main bulk of the Kangra erratics is by its mineral character, incapable of affording the proofs sought for, since under atmospheric action it scales off and weathers into rounded masses which retain scarcely a trace of the original surface, which they possessed as ice-borne fragments. A similar inappreciation of the most obvious physical considerations involved in the problem of the past history and conditions of the rocks he was examining is betrayed by Mr. Campbell's searching the coarse boulder conglomerates, both of the Sivalik group and its overlying deposits, and the river shingle at Hardwár on the Ganges for striated blocks, where both the conditions and materials are such as to afford about as much chance of finding glacial striation on the pebbles (had such ever once existed,) as would be offered to any one searching with a similar object the boulders of the Chesil bank and Portland roads. As regards direct differences of opinion touching the facts of the case, Mr. Campbell says he could discover no 'perched' blocks. Mr. Medlicott, who it may be supposed knows a 'perched' block when he sees one, was more fortunate. Equally unable was Mr. Campbell to find even "one hog-backed ridge," the form which I have said distinguishes the best marked moraines in Kangra. One such is at Dhada, and here Mr. Campbell could see nothing but a V gorge. Now the V gorge is there I admit; but it is cut out of the huge linear talus, hog-backed in section, which, I hold, marks the course of an old moraine. It is this Dhada section, as interpreted by Mr. Campbell, which shows that he has wholly failed to grasp my idea of the palæorography of the district. Mr. Camp-

bell's words are, "Close to the bridge I found a section of the 'big stone formation' and got to the solid rock surface under it, newly exposed in a gravel pit. The stuff is sorted in layers of varying coarseness from fine angular sand to the big stones. The bed is *not* glaciated. The thickness of the deposit may be 80 to 90 feet."

Now if Mr. Campbell had studied my paper carefully, he would have seen that I place the level along which the old glaciers descended, at approximately 150 feet *above* the present stream beds; and as the thickness of the whole mass at Dhada is placed by him at 90 feet, the great bulk of this moraine has at this spot suffered rearrangement by water and subsidence, the original bed along which it descended, and where alone glaciation might be looked for, having been much above the existing surface level of the country; this *rather* important element in my view of the case Mr. Campbell entirely overlooks, and actually confounds together the present V gorge with the long-vanished slopes, over which the glaciers descended, at a level roughly estimated by me at 150 feet above the present river beds.

This last estimate is of course conjectural and open to modification, but it represents the amount of vertical erosion since the retrocession of the glaciers and must be very considerable.

Lastly, I would say that I neither underrate or question the power of water confined in a gorge to move very large blocks. Mr. Campbell uses the term rather vaguely, though he specifies blocks of 14 and 15 feet diameter, or say roundly 50 feet in girth. These and much larger ones may, I repeat, be moved *down a gorge* by the action of water, but when one finds blocks ranging from 100 to 140 feet in girth standing in open ground, I frankly confess I can recognise no vehicle of transport equal to the occasion save ice.

Without going into details, there is one important correction which I may here make as regards the relative age of the glacial period in Kangra and the Sivalik group. In my paper I incline to the post-glacial age of the group, on confessedly inadequate evidence. Since then, the occurrence of what I hold to be glacial debris, strewed over the denuded edges of Sivalik strata, has led me to accept the view, so ably urged by Mr. Medlicott in his note to my paper, which identified the glacial period in Kangra with that of European Geology, and if this be so, I see no grounds for questioning the former extension of glaciers in India, on as grand or even far grander scale than they attained in the comparatively dwarfish ranges of Europe—though my largest estimate dwindles to insignificance before the vision of the great ice-cap 10,000 feet thick, stretched from the equator to the pole, which Mr. Campbell has (somewhat unnecessarily in my opinion) laboured to efface. The correlation too, of the Kangra glacial period with the European does away with the necessity of supposing a former

elevation of the country, equivalent to a reduction of temperature calculated by Mr. H. F. Blanford at about 20° Fahr., and reduces the difficulties surrounding the question, and the differences of opinion of all save extreme anti-glacialists within very much narrower bounds.

3. *Remarks on the Abstract and discussion of Dr. O. Feistmantel's Paper, entitled "Giant-Kettles (pot-holes) caused by Water-action in Streams in the Rdjmahal Hills, and Barákar district." By V. BALL, M. A., F. G. S., Geological Survey of India.*

As I was not present at the meeting of the Society in March when the above-mentioned paper by Dr. Feistmantel was read, I wish it to be understood that the following remarks are based on the published abstract\* of the paper and the account of the discussion which followed it.

Dr. Feistmantel claims for his observations an originality and importance which, I think, I shall be able to shew they do not possess.

Ordinarily speaking, if an author can be found to write and a Society to print a paper on a subject like the above, there might perhaps be no good reason for special remark or criticism. The paper may be in itself a valuable contribution to knowledge. It is because the writer, inferentially if not directly, casts a slur upon a Department, and the Society is one in which many of the members of that Department take a warm interest—that the occasion seems a fitting one for protest.

If the phenomena were of such rarity and importance as is stated, it would have been an act of grave omission on the part of the officers of the Geological Survey not to have described them in full detail on every occasion that they met with them.

A geologist, in India especially, where large areas have to be described, must however use some judgment in the selection of phenomena for description. I think I may say that Pot-holes are one of those which may safely be relegated to a minor position and passed with little or no notice.

The origin of many simple phenomena of denudation, erosion or deposition are subjects suitable for description in elementary manuals; but if all this A. B. C. is to be reopened and discussed and supported by tables of measurements in every descriptive memoir; what will be the length of such pre-Raphaelite descriptions? and where will they find a period?

I am sure there is not a member of the Geological Survey who would not be ready to support the statement made at the meeting by Mr. H. Blanford to the effect that "the phenomena were exceedingly common and their explanation generally obvious." This assurance one would have thought, from so competent an authority, ought to have been suffi-

\* P. A. S. B. March, 1877, pp. 77-79.

cient to settle the question ; but as Dr. Feistmantel has expressed a doubt regarding its correctness I purpose to give some evidence on the subject.

My reason for taking upon myself this somewhat ungracious task, is that the statements made in the paper appear to affect me slightly more directly than they do most of my colleagues. Before my recently published memoir on the Rajmahal hills went to press, Dr. Feistmantel described to me the pot-holes he had observed in that part of the country. Apparently he quite forgets that I told him that I had not only observed them there, but also in many other parts of India.

It would be very much easier to enumerate a list of places where pot-holes are to be found in India than to produce a similar number of published notices of them, simply because they have not been thought worthy of mention. They are just the objects which would be likely to attract the notice of an amateur, while weightier and more important phenomena were left to explain themselves. It is no matter for surprise, therefore, that Dr. Feistmantel should find a reference to an amateur who has mentioned pot-holes, but it is very great matter for surprise that he should not have very carefully examined the publications of the Geological Survey before permitting himself to make the statements he appears to have made in reply to Mr. Blanford. Two of the references I shall give are to papers published since Dr. Feistmantel's arrival in India. It is possible that the *Memoirs and Records* may contain others, if they do not, it is for the reason above given. Out of the Survey publications too, there are at least two known references to the subject ; but I shall confine myself to the officers of the Survey for affording evidence of the abundance and very general distribution of Pot-holes in India.

The first witness I propose to quote is Dr. Feistmantel himself. Since his arrival in India he has on two occasions *only* made short tours in the rocky districts of Bengal. On both these occasions he has, in totally different formations, observed series of pot-holes which have supplied the text for his paper. Yet in spite of this fact, and positive assurance to the contrary, he maintains that the phenomena must be of rare occurrence in India.

Of published notices by officers of the Survey I only quote four, the first two have been pointed out to me, the others were known to me for reasons that will be obvious. In the *Geology of Trichinopoly*,\* &c., by Messrs. King and Foote, we find the following passage: "In the first small nullah which runs under the high road about  $1\frac{1}{2}$  miles east of Vellum, and reaches the low ground to the north of Pullayaputty, are several small but well marked and instructive examples of pot-holes formed by the grinding action of pebbles rapidly rotated by the eddies in the stream. In several of the pot-holes the pebbles were still lying, the force of the

\* *Memoirs*, Vol. IV. p. 259.

stream not having been sufficient to wash them out of the steep-sided holes they had been instrumental in scooping." In his recently published account of the South Mahratta country,\* Mr. Foote has mentioned pot-holes twice.

Describing the remarkable scenery in the neighbourhood of the falls of Gokak on the Ghatpraba river, he writes "For some distance above the fall, the water runs at a very great pace, and has in consequence worn many fine specimens of pot-holes in the very hard quartzite, some beds of which, both here and in many neighbouring sections, are typical 'waxy' quartzites showing beautifully preserved rippling. These pot-holes are very favourite bathing-places for numerous Brahmans and others, who perform semi-religious pic-nics at this lovely spot in honor of Malingeswar" (p. 88). Again speaking of the Malprabha river we find—"During great floods the water rises from 30 to 40 feet in the gorge, and flows with great impetuosity, forming numerous pot-holes of great size and depth which, as at the Gokak falls, are at certain seasons largely resorted to by Hindus anxious to wash away their sins in the purifying river." (p. 99.) There is nothing here to suggest that Mr. Foote regarded the phenomena as exceptional or requiring any elaborate explanation.

In the year 1864, shortly after my arrival in the country, I joined Mr. Hughes who was at that time engaged in the examination of the Bokaro coal-field. I can remember very distinctly being much struck with the pot-holes we met with in several river-beds, and on turning to Mr. Hughes' memoir, I find the following allusion: "The felspathic sandstone holds steadily on down the stream, worn into hollows of every conceivable shape: pot-holes meet one at every step."†

In my description of the Raigarh and Hingir Coal-field,‡ when pointing out the lithological and structural characters of the upper sandstones (Kamthis), I have written as follows—"Mechanically formed pot-holes are, for some reason which I cannot explain, less common than in the Barákar rocks."

Here, it will be observed, I have made the scarcity of these pot-holes a subject for comment, an abundance of them being the more normal state of things.

Dr. Feistmantel has expressed an unwillingness to receive assurances that these are common phenomena unless such assurances are accompanied by accurate measurements. Such details I am not at the present moment prepared to give, but I must assert here, most positively, that there is not a single formation in India which I have examined, in which, where the

\* *Memoirs*, Vol. XII.

† *Memoirs*, Vol. VI, p. 91.

‡ *Records*, Vol. VIII, p. 114.

conditions have been favourable, I have not observed pot-holes. I can recall very many localities, some of them met with only during the present year, in quartzites of Vindhyan age.

Pot-holes may be rare in European streams from various reasons, but where the conditions are favorable they must, like other forms of erosion, irresistibly be produced. Although unable to quote instances from personal observation in streams, I have seen not a few on the sea coast where the necessary movement to the pebbles is caused by the ebb and flow of the tide or by currents. Some of those that I can remember were in Cambrian quartzites in the Bay of Dublin, where they often formed natural aquaria which could be visited at low tide and generally yielded marine animals. When the growth of weeds or zoophytes at the sides or bottom prevents the further revolution of pebbles, such pot-holes cease to increase their dimensions.

In limestone rocks similar holes may at times be observed, but though in some cases mechanical action may have had much to do with their formation, chemical solution may have been the more efficient factor.

For the benefit of any future historian I add the following facts which may find a place in a chapter on the economic uses subserved by pot-holes in India. Besides their more common employment as bathing-places and substitutes for clothes-washing tubs, the smaller ones are much used by the jungly aboriginal tribes for preparing the wild arrow-root or *tekúr*. The roots are pounded and crushed in these natural mortars, the stringy portions are removed and the farinaceous feculæ allowed to subside at the bottom of the water. My attention has frequently been drawn to this mode of using them by the peculiarly offensive odour which arises from the refuse in this manufacture. They are also often used for steeping the roots or bark of certain trees the decoction from which is employed largely in poisoning fish in the streams.

Dr. FEISTMANTEL said he was very much obliged to Mr. Ball for the information regarding the mentioned cases of pot-holes which he had omitted to notice, he greatly regretted not having known them, but they still did not prove that the pot-holes are so worthless and uninteresting a subject as it would seem from the remarks of Mr. Ball and Mr. H. F. Blanford, the more so, if we consider all the papers which have been written by well-known authors on this subject, not only on pot-holes unconnected now with any water action, but also on those formed at present in streams and under glaciers. His only intention was and is, to describe and illustrate properly some cases of Indian pot-holes (which up to date has not been done) that might be referred to in future, and that European geologists may know of instances of pot-holes in India, which they certainly will not consider as completely without interest; the sketches will prove still more interesting.

He regretted the more having omitted to quote the "*en passant*" notices of pot-holes in the Survey Memoirs, as they gave to Mr. Ball the occasion for his remarks, in which, however, that gentleman has not added any explanation on the subject, but on the contrary has treated it quite as a personal affair.

While admitting that he had been ignorant of four or five mentions of pot-holes, he imagined that Mr. Ball was unacquainted with a much larger series of papers treating on this subject, which he would therefore recommend to his consideration (Dr. Feistmantel read a list of these papers). They all show that pot-holes were considered *worth description* from long ago up to the present date, although they are so common; even the most common phenomena must be described in order to be known.

Therefore, Dr. Feistmantel said, his principle would always be to *examine all phenomena, even if they be very common*, as circumstances may often make them become very important, as an instance of which he might mention the re-discovery of *Glossopteris*, thought by some authors palæozoic, in the Keuperic Panchet group, and the discovery of it in the Middle Jurassic Jabalpur group, on which he would have something to say on a future occasion.

Mr. H. F. BLANFORD drew attention to the report of Dr. Feistmantel's remarks in the March Proceedings of the Society, and especially the following passage "Dr. Feistmantel said he very much doubted whether Mr. H. F. Blanford's statements that these pot-holes are exceedingly common, is correct; otherwise they would have been more frequently noticed and described." Dr. Feistmantel's industry in collecting the very long list of papers on the subject, only a portion of which time would allow of his even enumerating by their titles, had now afforded the most complete refutation of the grounds of his opinion above given, that could possibly be desired; and, as regards India, Mr. Ball's paper just read, would probably be thought equally conclusive. In his own remarks, to which Dr. Feistmantel had taken objection, he had however spoken only of the results of his personal experience. In North Wales, where he had done his earliest work in field geology, pot-holes were exceedingly common; in Cornwall, where his next work was done, they were also very common; and in every part of India in which it had been his fortune to work at field geology, the same rule held good.

It is then amply established that in Europe, as in India, pot-holes in streams are so common, that it is rather a matter for surprise that there is such an extensive literature on the subject as Dr. Feistmantel has adduced. In part, this is perhaps due to the somewhat undue attention given to minutiae in certain schools of Geology. He had accompanied one of the writers quoted by Dr. Feistmantel, in geological excursions with his class,

and having himself then recently left the School of Mines in London, he had been much struck with what appeared to him to be the undue amount of attention given to little details, which any one might observe for himself, and the slight amount of attention given to the geological structure of the country, its orographical features and similar matters of high importance, but less obvious, especially to students. But he also thought it probable that Dr. Feistmantel had somewhat confused his authorities. The formation of pot-holes in streams was an obvious phenomenon, which is almost too common to deserve notice, but he understood that the point of many of the communications enumerated by Dr. Feistmantel was, that the holes described occurred in places where it was impossible to account for them by stream action, which is a very different matter; and which would furnish a reasonable ground for describing them. But in that case, they were clearly irrelevant as affording a justification for the publication of elaborate descriptions of pot-holes occurring in streams.

Mr. W. T. BLANFORD said,—I agree fully with Mr. Ball, and I can confirm his remarks on the common occurrence of pot-holes both in streams and on the sea coast. I believe it would be difficult to find a rocky stream in the country in which none occur. He is undoubtedly correct also in the reasons he has assigned for the paucity of notices of those phenomena in the published memoirs of the Survey. It would be absurd to devote space to the record of useless details about a common form of erosion with which geologists are familiar, and which has been well known and explained in elementary works for at least a quarter of a century.

The greater part of the papers by European geologists which are quoted by Dr. Feistmantel appear to me to refer to a different subject. He has described pot-holes in streams, with which all field geologists are well acquainted, and the origin of which is obvious; the European and American writers have described holes on hill sides, and even on the summit of a watershed, a very different matter. The latter is the case with the papers by Brögger and Reusch, Helmersen, and Jackson, or with three out of the five papers mentioned by Dr. Feistmantel in the Proceedings, and the other two are only short notes.

Mr. BALL said:—After the remarks of Mr. H. Blanford and of the Chairman I do not think there is anything left for me to reply to. Dr. Feistmantel's paper may be a valuable one, that is not the question. My object has simply been to point out certain errors of fact published in the Proceedings. I have to regret that Dr. Feistmantel has not, apparently, quite understood this to be the sole object of my paper, and has not availed himself more completely of the opportunity which has now been afforded him of withdrawing his former statements, which are justly objected to by, I believe, most of the members of the Geological Survey.



4. *Some notes on Birds of the Genera Pellorneum and Pomatorhinus, with a description of a variety of Chleuasicus ruficeps, Blyth.* By MAJOR H. H. GODWIN-AUSTEN, F. R. G. S.

Since writing the remarks on the genus *Pellorneum* published in Part II, No. 1 of the Journal for this year, I have, I think, determined a bird among those collected by Mr. Ossian Limborg on and under the Mulé-it range, Tenasserim, as the *Pellorneum Tickelli* of Blyth, originally from the same locality, where it was obtained by Capt. Tickell. This is not a *Pellorneum* but should, I consider, be placed in the genus *Alcippe*.

Its having been first placed in the genus *Pellorneum* is, I suspect, the reason (as it was in my own case) of the considerable confusion that has arisen regarding it, and led me and others to think *Pellorneum Tickelli* possessed the striated frontal plumage seen in typical *P. ruficeps*. Blyth commences his description of *P. Tickelli* by saying "absolutely identical in structure with *P. ruficeps*"; this, though it is clear enough on careful reading that Blyth was not alluding to coloration, yet brings *P. ruficeps* and its allies vividly to the mind. No mention is made of any markings on the breast; the description being in fact that of a dull-plumaged bird about which very few lines could be given. Mr. Oates appears to have recognized the species, and, in his list of Birds from Upper Pegu (Stray Feathers, Vol. III. p. 119), finds fault with the describer by saying—"agrees pretty well with Blyth's meagre description"; but this meagre description is almost as much as could be written about so dull-plumaged a bird, and, supplemented by that of Captain Tickell, is ample. In fact, it applies exceedingly well, even to the measurements, to the specimens we have lately received, and of which I give some account and the dimensions below. When this identification was made, I remembered that in the Museum we possessed two very similar mounted but unnamed birds (No. 852a), the history of which had been lost; on comparison they proved identical with the Tenasserim form and are very probably the original type specimens, the labels of which have been destroyed since Blyth described them.

Mr. Oates, in S. F. Vol. IV, p. 406, again calls attention to the two birds, and in continuation of his original identification of *Pellorneum Tickelli*, gives some account of the specimens in his possession, but he is perfectly wrong and unjust in his strictures when he takes Lord Tweeddale to task for making *P. Tickelli* equal to *P. subochraceum*, for if he will turn again to J. A. S. B. 1875, p. 114, he will find that it was Mr. Blyth who made this identification.

Lord Tweeddale had never seen a specimen of *P. Tickelli* but naturally thought that Blyth knew his own species. Therefore, assuming Mr. Blyth was right, and as *P. minor* (*rectius minus*) and *P. subochraceum* were known

to be the same, the next species was referred to *Tickelli*; and only this part appears within brackets. The 4th *Pellorneum* in my last paper should stand as *P. subochraceum*, Swin., originally described from Tenasserim, while *P. Tickelli* should be removed to the genus *Alcippe* with its near allies, *A. Phayrei*, *A. affinis*, *A. albogularis*, &c.

ALCIPPE TICKELLI, Blyth.

*Desc.*—Above all olivaceous brown, wings and tail more of an umber-colour, the feathers of the head and back are very indistinctly pale-shafted; frontal margin, lores, and round the eye, buff with a ruddyish tinge; the same ochraceous colour tinges the chin and throat and under parts, darker on the flanks and whitish on centre of the abdomen.

Bill above horny brown, pale fleshy white below. Irides light brown.

Length about 4·8; wing 2·5; tail 2·1; tarsus 1·0, bill at front 0·60 inches.

HAB.—Near Mitan on the Houngdarao River, Tenasserim.

A specimen of *Pomatorhinus hypoleucus*, var. Blyth = *Tickelli*, Hume, lately described in *Stray Feathers*, Vol. V. p. 32, in the middle of 'A List of Birds of North Eastern Cachar', is in the Indian Museum among Blyth's types, together with the two type specimens of true *P. hypoleucus* from Arakan sent by Capt. A. Phayre. The specimen agrees in measurement and in every way with the original description and is undoubtedly the very bird Blyth described. It is a well marked species. With regard to Mr. Hume's *Pom. Inglisi* described in the same publication, I may state that the description of *P. hypoleucus* in the 'Ibis', was made by Jerdon from a bird in my collection obtained at Asálu in the North Cachar Hills when Dr. Jerdon was staying with me at Cherra Púnj in 1869; and I have a water-colour sketch of the head of the bird made just after it was shot. I think it premature to separate this from the Arakan bird until we can compare it with fresh examples from the original locality. The two type-specimens mentioned above are not in a state to enable us to do this in a satisfactory manner, having become bleached—the whole upper parts being of the same rusty hue throughout and all the grey having vanished from out of the lower plumage. The amount of rufous on the side of the head is a varying quantity. In my Asálu bird it is, as described by Mr. Hume, very faintly indicated, and Jerdon, not always very minute in his descriptions and with sight then becoming impaired, overlooked it. In specimens I now have by me, from the Nágá Hills, many miles to the east, the rufous patch on the neck and the rufous line from behind the eye are very strongly and intensely developed.

CHLEUASICUS RUFICEPS, Blyth, var. ATROSUPERCILLARIS.

No mention being made of the black eyebrow in the original description

of *C. ruficeps*, and finding it absent in the type in the Indian Museum, I now describe the variety from Sadiya, Upper Assam.

*Desc.*—Bright ferruginous on the head, same colour paler on the nape and ear-coverts; back and wings pale olive-brown; quills tinged rufous; tail brown; a narrow black streak over the eye beneath dull white with an earthy tinge.

Legs dark plumbeous.

Length about 6; wing 2.85; tail 3.3; tarsus 0.90; bill at front 0.43 inches.

Larger than *Ch. ruficeps* and not so white below.

Mr. W. T. BLANFORD said he was afraid that he had been to some extent the cause of the confusion about *Pellorneum Tickelli*. Some years ago, he had suggested (Ibis 1872, p. 87) that *Pellorneum subochraceum* of Swinhoe was the same species. Dr. Jerdon went rather farther and, in his 'Supplementary Notes', stated that the two species had been pronounced identical. The same view was accepted by Mr. Blyth in his 'Mammals and Birds of Burma.' It is therefore not surprising that, when *P. subochraceum* was re-discovered, Mr. Hume gave it a fresh name and called it *P. minor*. It is most satisfactory to have obtained again typical specimens of both species from the original locality and to have cleared up the synonymy.

5. *On an apparently undescribed Weasel from Yarkand.* By W. T. BLANFORD, F. R. S.

Mr. W. T. BLANFORD gave a description of an apparently new weasel from Yarkand. A skin was contained in the collections made by Dr. Stoliczka, but as the animal had been kept in confinement, it did not appear desirable to describe it as new, and it was not quite certain that it was more than a variety of *Mustela vulgaris*. A second specimen brought by Dr. Scully, which was precisely similar to the first, had proved on more careful comparison to be considerably larger than *M. vulgaris*, besides being of a very different colour, and having a proportionably longer tail. It was proposed to name this after Dr. Stoliczka. It might be briefly described thus:

*Mustela Stoliczkana*, sp. nov. Pale sandy brown above, white below, tail coloured like the back throughout and about  $\frac{1}{4}$  the whole length, feet well clad with long hairs beneath. Size larger than *M. vulgaris*, about equal to *M. erminea*.

Dr. ANDERSON exhibited a living, adult female Bamboo-rat which had recently been sent to the Zoological Gardens, Alipore, by Mr. A. H. Hildebrand, Asst. Commissioner, Burma. No details regarding the habitat of the animal had been as yet received, beyond that it had been obtained

from the Salwín Hill Tracts. Dr. Anderson pointed out that Sir Stamford Raffles had described a bamboo-rat, apparently from Malacca, under the name of *Mus Sumatrensis*, and that the drawing of this form by Major Farquhar to which Sir Stamford Raffles refers in his "Descriptive Catalogue\* of a Zoological Collection made in Sumatra", is now in the library of the Royal Asiatic Society of London. This drawing Dr. Anderson had recently examined and he was thus enabled to state that while certain bamboo-rats from Malacca in the Indian Museum agreed with the drawing, the present living example from the Salwín Hill Tracts did not, and that there was a bamboo-rat in the Indian Museum from Tenasserim referred to *Rhizomys Sumatrensis*, but which differed from the Malacca specimens and agreed with the living animal now before the Society. Dr. Anderson was therefore inclined to consider that two species had been confounded with each other under *R. Sumatrensis*. McLelland, however, had described a bamboo-rat from Tenasserim as distinct from *R. Sumatrensis*, but Dr. Anderson had not been able to identify *R. cinerea*, McLelland, with the Museum Tenasserim specimen nor with the living animal from the Salwín Hill Tracts. This form from the Salwín and Tenasserim is distinguished from *R. Sumatrensis* by its bright golden red cheeks and sides of the head generally, by the absence of white spots on the forehead, and by the dark iron-grey of the upper parts (many of the hairs being white-tipped) becoming almost black on the top of the head, where it abruptly ceases between the eyes in a sharp well-defined point. The upper lip, chin, and upper part of throat white, also the chest and belly, which are, however, more or less tinged with grey and reddish. Lower portion of throat dark grey. The feet are sparsely clad and leaden coloured, except the toes of the hind foot, which are fleshy white. The tail is rather thick at the base, quite naked, not scaly, and of a leaden hue. Claws rather broad and moderately strong.

*Measurements of the living adult ♀ specimen*

|                                                       |       |
|-------------------------------------------------------|-------|
| Tip of nose to ending of hair over root of tail,..... | 14.75 |
| Ending of hair of body to tip of tail, .....          | 5.35  |
| Length of hind foot, .....                            | 2.56  |
| Height of ear, .....                                  | 0.80  |
| Breadth of ear,.....                                  | 0.64  |
| Tip of nose to anterior angle of eye, .....           | 1.31  |
| Posterior angle of eye to ear,.....                   | 1.29  |
| Length of eye, .....                                  | 0.39  |
| Breadth between eyes,.....                            | 1.38  |
| "      "      external margin of nostrils, .....      | 0.50  |
| "      "      ears, .....                             | 2.10  |
| "      of tail at base, .....                         | 0.77  |

\* Trans. Lin. Soc. London, Vol. XIII (182), p. 258.

If *R. cinerus* does not prove to be distinct from *R. Sumatrensis*, Dr. Anderson proposed to designate this red-cheeked bamboo-rat *Rhizomys erythrognys*.

# LIBRARY.

The following additions have been made to the Library since the Meeting held in June last.

## TRANSACTIONS, PROCEEDINGS, AND JOURNALS, presented by the respective Societies or Editors.

Bombay. The Indian Antiquary,—Vol. VI. Pts. 67, 68, 1877.

Pt. 67. *J. W. McCrindle*.—The Fragments of the Indika of Megasthenes. *J. F. Fleet*.—Sanskrit and Old Canarese Inscriptions. *Rev. R. Caldwell*.—Substance of two Sâsanas in Sir Walter Elliot's collection of South Indian Inscriptions.

Pt. 68. *Dr. G. Bühler*.—Three new Edicts of Asôka.

Boston. The Boston Society of Natural History,—Memoirs, Vol. 2, Pt. 4, Nos. 2 to 4.

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Vol. 17. Pt. III. *S. H. Seudder*.—Notes on Orthoptera from Northern Peru. *A. Hyatt*.—Jurassic and Cretaceous Ammonites from South-America. *R. Bliss, Jr.*.—Remarks on the Fin-spines of the Siluroides and Doradoids. *H. A. Hagen*.—History of the Development of Museums of Natural History.

Pt. IV. *S. H. Seudder*.—A century of Orthoptera.—On Sparagemon, a genus of *Ædipodidæ*. Revision of two American Genera of *Ædipodidæ*. *J. H. Emerton*.—Structure of the Palpus of male Spiders.

Vol. 18, Pt. I. *J. W. Putnam*.—On the Habits of the Blind Crawfish, and the Reproduction of lost parts. *S. H. Seudder*.—On Fossil Insects from Cape Breton.

Pt. II. *W. K. Brooks*.—Embryology of Salpa. *Prof. J. D. Dana*.—On Metamorphism and Pseudomorphism.

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*Dr. N. M. Hentz*.—The Spider of the United States.

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*L. Trouvelot*.—On the Veiled Solar Spots. *Prof. E. C. Pickering*.—Height and Velocity of Clouds.

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- Décembre 1876, à l'occasion du vingt-cinquième anniversaire de sa fondation.
- Dublin. The Dublin University Biological Association.—Proceedings, Vol. I, No. 2, 1874-75.
- Prof. Macalister.*—On two new species of Mites.
- Leipsic. Der Deutsche Morgenländische Gesellschaft,—Zeitschrift, Band 30. Heft 4.
- E. Haas.*—Ueber die Ursprünge der Indischen Medizin mit besonderem Bezug auf Susruta. *D. H. Müller.*—Himjarische Studien.
- London. The Athenæum,—Nos. 2581—2585, 1877.
- . The Geographical Magazine,—Vol. 4, Nos. 4 and 5, 1877.
- No. 5. The Famine in Madras and Bombay. *C. R. Markham.*—The Himálayan System.
- . Nature,—Vol. 15, Nos. 389-392, 1877.
- New Haven. The Connecticut Academy of Sciences and Arts.—Transactions, Vol. III, Pt. 1.
- S. I. Smith*, and *O. Harger.* Report on the Dredgings in the region of St. George's Banks in 1872. *S. F. Clark.*—Descriptions of New and Rare Species of Hydroids from the New England Coast.
- Paris. La Société de Géographie,—Bulletin, Mars, 1877.
- Colonel L. Kostenko.*—Expédition aux monts Alai.
- . La Société Zoologique de France,—Bulletin, Parties 4—6, 1876 et Partie 1, 1877.
- Partie 4. 1876. *P. Carbonier.*—Le Gouramie et son nid.
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- Vol. 9. *F. B. Meek.*—A Report on the Invertebrate Cretaceous and Tertiary Fossils of the Upper Missouri country.
- Vol. 10. *Dr. A. S. Packard.*—A Monograph of the Geometrid Moths or *Phalanidae* of the United States.

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- . Report on the Administration of the Meteorological Department of the Govt. of India in 1875-76. Folio. Pamphlet.
- ELLIOTT, J. Report of the Vizagapatam and Backergunge Cyclones of October 1876. Folio. Calcutta, 1877.

HAYDEN, F. V. Annual Report of the United States Geological and Geographical Survey of the Territories embracing Colorado and parts of Adjacent Territories, for 1874.

KALI PRASAD SRIVASTAVA DUSRE, MUNSHI. The Kayasthæthnology; being an inquiry into the origin of the Chitraguptavansi and Chandrasenavansi Kayasthas. 8vo. Lucknow, 1877.

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Calcutta Municipal Returns for 1874-75.

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GOVT. OF BOMBAY.

Selections from the Records of the Madras Govt., No. 55. Report on Vaccination throughout the Presidency and Provinces of Madras for 1875-76.

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Report on the Nagpur School of Medicine, Central Provinces, for 1876-77.

Report on the Goals of the Central Provinces for 1876.

CHIEF COMMISSIONER CENTRAL PROVINCES.

The Prithvi Raj Rasa of Chand and Bihsris' Poems.

COLONEL S. B. MILES.

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THE TRUSTEES OF THE INDIAN MUSEUM.

Káyastha Kaustubha, by the late Rájá Narain Mittra.

DR. RÁJENDRALÁLÁ MITRA.

Map of Turkey in Europe and the Black Sea, with the adjoining parts of Russia and Turkey in Asia. May, 1877.

CAPT. J. WATERHOUSE.

The Travels of Guru Tegh Bahadur and Guru Gobind Singh. Translated from the original Gurmukhi by Sirdar Attar Sing. 8vo. Lahore, 1876.

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Scientific Results of the Exploration of Alaska by the parties under the charge of W. H. Dall, during 1865-74, Vol. 1.

THE REV. C. H. A. DALL.

Catalogus Codicum Orientalium Bibliothecæ Academicæ Lugdunobatavæ auctore Dr. M. Th. Houtsma.

THE CURATORS.

The Mahabharat, edited by Bábu Protap Chunder Roy, Vol. 1, Nos. 5 and 6.

THE EDITOR.

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No. 911. On the action of Sea-water on Lead and Copper.

———. The Journal of the Society of Arts,—Vol. 25, Nos. 1273—1276.

No. 1274. *Dr. B. H. Paul*.—The Chinchona Alkaloids, their Sources, Production and Use.



- No. 1275. *Major-General Sir F. J. Goldsmid.*—The Existing and Possible Commercial Communications between Persia and India.
- No. 1276. *Capt. Tyler.*—Continuous Breaks for Railways.
- Palermo. *La Società degli Spettroscopisti Italiani.*—*Memorie, Dispensa 4, Aprile, 1877.*
- P. Tacchini.*—Macchie solari e facole osservate a Palermo nei mesi di febbraio, marzo ed aprile, 1877.
- Paris. *Comptes Rendus.*—Tome 84, Nos. 14, 15, 16 et 18, 1877.
- No. 14. *M. J. Boeckel.*—Deux cas d'anévrisme du pli du coude, traités avec succès par la ligature antiseptique de catgut. *M. Ed. Blanc.*—Observation d'éclairs en boule se formant et éclatant sans bruit au-dessus d'une couche de nuages.
- No. 15. *MM. G. Lechartier et F. Bellamy.*—Sur la présence du zinc dans le corps des animaux et dans les végétaux. *M. Galippe.*—Nouvelles expériences sur l'action toxique attribuée au cuivre et aux substances contenant du cuivre en combinaison.
- No. 16. *M. J. Guérin.*—Nouvelles expériences sur l'origine et la nature de la fièvre typhoïde. *M. E. Franck.*—Recherches sur les troubles cardiaques qui déterminent les intermittences du pouls artériel dites *fausses intermittences.* *M. V. Feltz.*—Expériences démontrant que la septicité du sang putréfié ne tient pas à un ferment soluble.
- No. 18. *MM. Pasteur et Joubert.*—Étude sur la maladie charbonneuse. *M. G. Planté.*—Lumière électrosilicique. *M. V. Feltz.*—Expériences démontrant que la septicité du sang putréfié tient aux ferments figurés.
- . *Journal des Savants, Avril, 1877.*
- . *Revue des deux Mondes.*—Tome 20, Livraison 4; Tome 21, Livraison 1, 1877.
- Tome 20, Liv. 4. *M. E. Planchut.*—L'archipel des Philippines.
- . *Revue Scientifique, Nos. 42—46, 1877.*
- No. 42. *M. Ch. Darwin.*—La fécondation directe ou croisée dans le règne végétal. *M. E. Perrier.*—Des formes de passage entre les annélides, les mollusques et les zoophytes.
- No. 45. *M. C. Vogt.*—L'origine de l'homme.
- No. 46. *M. Bachofen.*—La famille et le mariage dans les sociétés primitives. *MM. Emm. le Maout et J. Decaisne.*—Traité général de botanique descriptive et analytique.

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- DANVERS, JULIAN. *Report to the Secretary of State for India in Council on Railways in India for the year 1875-76.* London, 1876. P. P.
- GRIMBLOT, M. P. *Sept Suttas Pâlis tirés du Dîgha-Nikâya.* 8vo. Paris, 1876.
- INDIA, statement exhibiting the Moral and Material Progress and Condition of, during 1874-75. P. P.
- PERSIAN GHAZALS, A century of, from unpublished Divvâns. 4to. London, 1851.
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- WALLACE, D. M. *Russia.* 2 Vols. Royal 8vo. London, 1877.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JULY, 1877.

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The monthly General Meeting of the Asiatic Society was held on Wednesday, the 4th July, at 9-15 P. M.

RAI RÁJENDRALÁLA MITRA, BAHÁDÚR, D. L., Vice-President, in the Chair.

The following presentations were announced :—

1. From the Author, "Religious and Moral Sentiments metrically rendered from Sanskrit writers," by Dr. J. Muir.

2. From the Home Department, Government of India. A set of Photographs of the Paintings at the Ajunta Caves, and a "Grammar of the Rong (Lepcha) Language, as it exists in the Dorjeling and Sikim Hills," by Colonel G. B. Mainwaring.

The CHAIRMAN remarked that it was in 1865 that the Society recommended to the notice of Government Colonel Mainwaring's Dictionary and Grammar of the Lepcha language, and obtained the sanction of a grant for their publication. The Society also moved the Government to allow Colonel Mainwaring to remain at Darjiling for the purpose of revising and completing his works. Circumstances had since occurred to delay the undertakings a great deal. He was, however, glad to be able to congratulate the Society on the completion of one of the works. He hoped the other would be soon out of press.

3. From the Right Hon'ble the Secretary of State for India, a copy of the Archæological Survey of Western India. Report on the Antiquities of Kathiawád and Kach, being the result of the second season's operations of the Archæological Survey of Western India, 1874-75. By J. Burgess.

4. From the Government of Bombay, a copy of Inscriptions from the large Cave at Managhát, taken by Mr. J. Burgess.

5. From Commander A. Dundas Taylor, I. N., Superintendent of Marine Surveys, the following Charts :

False Point Anchorage. Goa and Marmagao Roadsteads. Karachi to Vingorla. Vingorla to Cape Comorin. False Point to Mutlah River. Curves of equal Magnetic Variations for 1877.

6. From Bábu Gunendranáth Tagore, an engraving of the late Mahárájá Dwarkanáth Tagore.

The following gentleman, duly proposed and seconded at the last Meeting, was elected an Ordinary Member—

Nawáb Asghar 'Alí Khán Diler-jang Bahádúr, C. S. I.

The following gentlemen are candidates for ballot at the next meeting—

C. T. Peters, M. B., Surgeon, the P. W. O. Grenadiers, N. I., Belgaum, proposed by Capt. J. Waterhouse, seconded by Mr. H. Blochmann.

J. C. Reeves, Esq., Assistant Engineer, P. W. D., proposed by Mr. E. W. Oates, seconded by Mr. J. Wood-Mason.

Bábu Máharáchandra Vára, Pleader, High Court, Pingála, Mid-nipur, proposed by Bábu Pratápachandra Ghosha, seconded by Mr. H. Blochmann.

Dr. J. F. P. McConnell has intimated his desire to withdraw from the Society.

Mr. BLOCHMANN exhibited an impression taken by General Cunningham from a rupee struck by Muhammad 'Adil Sháh. He said—

General Cunningham has sent me an impression of a complete rupee (new variety) struck by Muhammad 'Adil Sháh, or 'Adlí, as he is often called, which adds a little to our knowledge of the history of that period.

The rupee is of the same size as the Islám Sháhí Rupee, published by Mr. Thomas in his 'Chronicles,' p. 411 and Pl. V, 190. The obverse is in fact identical.

OBVERSE—*Square area*, *لا إله إلا الله محمد رسول الله*

*Margin*, *ابابكر الصديق عمر الفاروق عثمان العفان علي المرتضي*

REVERSE—*Margin*, *مبارز الدنيا والدين ابو المظفر سحر \* ٩٦١*

*Square Area*, *سلطان محمد خلد الله ملكه و سلطانه و*

*عبي لاهور श्रीमहासद*

The full name of Muhammad 'Adil Sháh, therefore, is Mubáriz-uddín Abul-Muzaffar Muhammad 'Adil Sháh. The *julús* name was, no doubt, suggested by his real name, 'Mubáriz Khán'.

Regarding the year 961 and the 'Seal of Solomon' after the word *سحر* in the margin, *vide* J. A. S. B., 1875, Pt. I, p. 298.

Mr. W. T. BLANFORD exhibited a collection of pottery and various implements of stone, including flint knives, together with agate beads, copper ornaments, coins, &c. found by Major E. Mockler, Political Agent at Gwádar, amongst the ruins of dwelling places and tombs in various parts of Makrán (Balúchistán). Mr. Blanford said—

It is nearly a year since I had the pleasure of announcing to the Society\* some of the results of Major Mockler's researches amongst the ruins of tombs and other buildings in Makrán. I then exhibited some drawings of these ancient remains and of the articles found in them. A fuller account has since been published in the Journal of the Royal Asiatic Society. I have now the pleasure of exhibiting not only the original collection made by Major Mockler at Sutkágen Dor, Dámá Koh and some other places, but several additions to his former discoveries.

Amongst the specimens on the table from Sutkágen Dor, 40 miles northwest of Gwádar, are some very well shaped flint knives, precisely such as we might expect to have been split off from such cores as those from Sakhar on the Indus, which I exhibited in 1875,† and which are now in the Geological Museum. These knives were found together with several articles of pottery (apparently made on a wheel,) one of the best of which is a vessel resembling a drinking cup, (Pl. II, fig. 1) whilst some are extremely small, about an inch in diameter, and are considered by Major Mockler children's toys. They might perhaps have been intended to hold offerings to minor deities. Other articles found at Sutkágen Dor comprise cubes like dice cut in stone, stone and pottery beads, spheres of burnt clay resembling marbles and a few fragments of copper ornaments.

The next series of specimens are from Dámá Koh, 40 miles west of Sutkágen Dor. From this place and from other localities in the neighbourhood several very beautifully shaped articles of pottery, evidently intended for holding water, were procured by Major Mockler. These vessels have as a rule small orifices and well formed spouts; sometimes there is a second orifice. Some of the water pots are ornamented with lines and bands, and some small round vessels (fig. 2) have perforated projections at the side, evidently for the purpose of string being attached by which the pots may be suspended. Another very small vessel about five inches long has the form of an amphora (fig. 3). Besides the pottery, copper bracelets (fig. 5), a small copper lamp or ladle (fig. 6), carnelian beads, and stones for sharpening knives are exhibited, all procured from the *dámbs* or tombs of Dámá Koh, Júni and Gáti.

These form the first series of specimens sent by Major Mockler, and I had intended to exhibit them in April last. I have since received another

\* Proceedings for August, 1876, p. 172.

† Proceedings for July, 1875, p. 134.

valuable and interesting collection also exhibited, concerning which I will read a few extracts from a letter of Major Mockler's, dated 20th April, 1877.

"I am now sending you a lot of 'rubbish' picked up on my trip, which you can add to the former lot. I opened several more cairns and found some small differences in the mode of sepulture in each locality, also in the shape of the cairns. In my paper\* I described the square and oval types; there is also to the westward a long type, some of the cairns being as much as 50 feet long, but never more than 5 feet in breadth; in these cairns I found for the first time pots which had been exposed to the action of the fire, so that the dead must have been supplied with cooked food. I examined some of these on the Kohistán hill, near Soorag, and in one found a silver bracelet which had been soldered by lead, and copper arrow heads (which I had found at Tank before). \* \* \* The two stones from Chidízi I am most anxious to hear your opinion concerning, I take them to be stone hammers, used for what purpose I do not know, but possibly for breaking hard univalve shell fish. I feel sure that they have no connexion with the round grinding stones found in the towns, of which I have put in a couple of specimens. I should also be much obliged if you could find out and let me know whether the fragments of pottery from Balasar have anything like writing upon them.

"The copper coins from Sádátmand are, I am afraid, undecipherable; this place is on an almost inaccessible hill about 12 miles from Jashk where there are some very beautiful little cave temples hewn out of the solid rock, pillars, some square, some octagonal, &c., being left at intervals. On some of these pillars there are numerous inscriptions in the Hindi character; they are probably Buddhist."

Major Mockler adds copies of some of the inscriptions, which copies I have submitted to Dr. Rájendralála Mitra, who has with his usual kindness endeavoured to decipher them, but without complete success. One inscription he has been able to read, it runs *ráhadaganaśa chaitá* (the grave of Ráhadagana), but of the others only portions are intelligible. Dr. Rájendralála considers these inscriptions probably 800 or 900 years old.

Some of the articles recently sent appear to indicate much the same age as those from Dámba Koh, the date of which was fairly shewn by the occurrence of a Greek coin, but others may be of later date. The remains from Sutkágen Dor, comprising numerous flint knives, appear to be older. Much of the pottery from Balasar and some other places is glazed, and several articles of glass, including the remains of well formed bottles, are included in the specimens from the more western localities.

The marks on the Balasar pottery (fig. 10) look like letters but may be ornament. In one case (fig. 11) they certainly appear purely ornament-

\* Journ. Roy. As. Soc. 1876, IX, p. 121.

tal. The stone hammers (fig. 12) are very curious, resembling fossil vertebræ. It is difficult to suggest for what purpose they were intended. They are surrounded by a groove, which may have served simply to enable them to be grasped in the hand, or they may have been encircled by a band by which they were fastened in a handle.

All the articles mentioned in Major Mockler's letter are amongst those now exhibited, besides a large number of articles not specified. The whole will be presented to the Indian Museum, Calcutta.

The following are the articles figured in the accompanying plate.

- Fig. 1. Unglazed earthenware cup, from Sutkúgen Dor : one-fifth the natural size.
- „ 2. Vase of unglazed earthenware, with perforated projections by which it could be suspended ; from Dámha Koh, found in the ruins of a house : one-fifth the natural size.
- „ 3. Peculiarly shaped vessel of unglazed earthenware, with two perforated projections for suspension ; from Dámha Koh : one-fifth natural size.
- „ 4. Oblately spheroidal vessel, flattened below, of unglazed earthenware, with a small mouth, perhaps intended for carrying water or other liquids on bullocks, asses or mules ; from Júni : one-fifth natural size.
- „ 5. Copper bracelets with snake's head ornament, from Júni : one-fifth.
- „ 6. Copper lamp or ladle, from Júni : one-fifth.
- „ 7. Amphora of green glazed earthenware, from Gáti, 6 miles from Gwádar : one-fifth.
- „ 8. Unglazed earthenware vessel with spout and a handle of twisted cord-like form, beneath the handle is a small air hole ; the vessel is unsymmetrical and differs from all the others figured in this respect ; from Gáti : one-fifth.
- „ 9. Spout of another earthenware jar : one-fifth.
- „ 10, 11. Ornamental markings on glazed pottery from Balasar : one-fifth.
- „ 12. Stone hammer from Chidízí : one-fifth.
- „ 13. Copper arrow-head from Soorag : one-fifth.
- „ 14. Small urn-shaped vessel of green glazed earthenware ; from Girdkoh near Wank : one-fifth.
- „ 15. Flint knife from Sutkúgen Dor : full size.

Mr. BALL said—It might perhaps be of interest for him to mention that in a part of Balúchistán, far from the localities where the objects collected by Major Mockler were obtained, he saw a number of mounds containing fragments of ornamental pottery. These mounds were situated in the Khetrán valley near the borders of Afghánistán. The occasion was

in 1874 when, in company with Major Sandeman, he visited the Saluán region west of Dera Gházi Khán. There was no time for any exploration of the mounds to which their attention had been drawn by the Khetráns, who seemed to regard them as being of great antiquity. Certain it is that people of that part of the country, at the present day, neither use nor manufacture any description of pottery.

The CHAIRMAN said that the thanks of the meeting were due to Major Mockler for permitting his collection of antiquities to be exhibited to the meeting. They were highly interesting both from an antiquarian and an ethnological point of view. The study of the social condition of a people from the remains of their utensils, arms, and other domestic articles was of modern date; but it was one which, in the absence of other and more direct evidence, was of great importance, and in connexion with the dwellers of the Lake-habitations of Switzerland, and other ancient people had been very largely utilised. The evidence the articles afforded were also of a character, which none could gainsay, and were thoroughly authentic. For the illustration of the history alike of art and of civilization they were of inestimable value. He was not aware of the exact date of the articles; but accepting the opinion of his learned friend Mr. Blanford, founded upon fairly reliable evidence, that the articles must be about 2000 years old, he thought the fragments of glazed pottery exhibited were particularly interesting. In Arrian's *Periplus of the Erythrean Sea*, mention was made of the celebrated Murrhian cups which were said to have been exported from Bairigaza, modern Broach, but were manufactured in Guzerat and its adjoining provinces; as also in Oojein. Some antiquarians supposed that the cups were made of crystal; but there was no doubt now of their having been of porcelain, and the glazed pottery on the table showed that those who could prepare such excellent glaze, would not find the manufacture of porcelain impossible for them: at least the probability lay in their favour.

The specimens of glass on the table were not particularly good; but it was said that glass was manufactured in India from a remote period of antiquity, and mention of it was met with in many ancient works. The specimens gave a tangible proof of the assertion.

MR. WOOD-MASON exhibited specimens of new and little known insects collected by Mr. Ossian Limborg and staff in Upper Tenasserim, and read the following preliminary notes upon them:—

## ORTHOPTERA.

### Fam. PHASMIDÆ.

\* Female perfectly apterous; the metanotum proper much longer than the medial segment. A process at the hinder extremity of the sixth ventral segment of the abdomen.

1. *PHIBALOSOMA ACANTHOPUS*, Burm.

*Bacteria acanthopus*, Burmeister, Handb. d. Entom., 1838, Band II, Abth. 2, S. 565, ♀.

*Phibalosoma acanthopus*, Westwood, Monograph of Phasmidæ, 1859, p. 74, ♂ ♀.

A specimen of this species from Tenasserim has a lamellar process (not a spine, as in the type,) bilobed at the extremity, at the hinder end of the sixth ventral segment of the abdomen. It is a gigantic insect, measuring:

Total length 10 in. 1 line; head 6 lines; prothorax 3·75; mesothorax 25·5; metathorax 19; abdomen 4 in. 6·5 lines + 12·5 lines = 5 in. 7 lines; antennæ 2 in. 3 lines; anterior femur 2 in. 8 lines, tibia 3 in. 1 line; intermediate femur 1 in. 11·75 lines, tibia 2 in. 0·75 lines; posterior femur 2 in. 4·5 lines, tibia 2 in. 5 lines.

HAB. From Moolai to Moolat, Upper Tenasserim, 4000—6000 feet ♀ Singapore, ? (Burmeister); and Java ♂ ♀ (De Haan).

2. *PHIBALOSOMA ANNAMALLAYANUM*, n. sp.

♀. Very closely allied to the preceding, from which it differs in its stouter body, in its shorter and thicker legs, and in the relative proportions of the different parts of the body, particularly the meso- and metathorax.

The following are the measurements of a spirit-specimen:—

Total length 8 in. 9 lines; head 7 lines; mesothorax 19; metathorax 16; abdomen 3 in. 6·75 lines + 1 in. 2·5 lines = 4 in. 9·25 lines; antennæ 2 in.; fore femur 2 in. 2 lines, tibia 2 in. 6 lines; intermediate femur 1 in. 8 lines, tibia 1 in. 8 lines; posterior femur 1 in. 11 lines, tibia 2 in. 1 line.

HAB. Annamallay forests, Southern India, a single specimen preserved in spirits, obtained by Colonel R. C. Beddome; Travancore Hills, a much mutilated dried example, presented to me by Mr. F. Day.

3. *PHIBALOSOMA VIRGEA*, Westwood.

HAB. Sibságar, Assam, etc.

\* \* Female with minute scale-like rudiments of organs of flight and the metanotum proper equal to the medial segment. Hinder extremity of sixth ventral segment of the abdomen unarmed.

4. *PHIBALOSOMA WESTWOODII*, W.-M.

*P. Westwoodii*, Wood-Mason, J. A. S. B., 1875, Vol. XLIV, p. 216, ♀.

HAB. Samagúting, Nágá Hills, and Nazírah, Assam.

5. *PHIBALOSOMA CANTORI*, Westwood.

*P. Cantori*, Westwood, Monograph of Phasmidæ, p. pl. XXXVII, fig. 1, ♂, XXXVIII, fig. 1, ♀.

HAB. Malacca (Dr. T. Cantor).

Obs.—The specimen figured by Westwood as the male of *P. Cantori* may turn out to be that of the preceding species, the head being similarly



furnished with two tubercles of greatly unequal size, not a trace of which is to be seen in its supposed partner.

*LONCHODES GODAMA*, n. sp.

Very closely allied indeed to *L. verrucifer* (from the Andamans), but differing in its more scabrous body, especially in the male, in having the head armed with a transverse curvilinear ridge of varying development instead of conical horns, in having the supra-anal plate in the female longer than the terminal dorsal abdominal segment, in its greater size, in the structure of the male forceps, etc.

A male and a female measure respectively :—

♂ Total length 4 in. 4 lines ; head 1·75 lines ; prothorax 1·75 ; mesothorax 13·25 ; metathorax 8·75 ; abdomen 20·75 + 5·5 = 21·25 ; antennæ 22·25 ; anterior femur 12·75, tibia 14 ; intermediate femur 8·75, tibia 10 ; posterior femur 10, tibia 13·25.

♀ Total length 5 in. 9·5 lines ; head 3·25 lines ; prothorax 3 ; mesothorax 16 ; metathorax 11·25 ; abdomen 2 in. 5·25 lines + 6 lines + 2·5 lines = 3 in. 1·75 lines ; antennæ 2 in. ; anterior femur 14 lines, tibia 14 ; intermediate femur 10·5 lines, tibia 10·5 ; posterior femur 12 lines, tibia 13.

HAB. Ahsown, on the Tao Range, Upper Tenasserim, between 2000 and 6000 feet elevation,—abundant.

Obs.—In one specimen of the female the curvilinear ridge between the eyes is enormously developed and the supra-anal plate semioval as in *L. verrucifer* which latter difference seems to be the result of injury received during immaturity.

*LONCHODES PORUS*, Westwood.

*L. porus*, Westwood, Monograph of Phasmidæ, 1869, p. 42, pl. VII, fig. 9, ♂.

The female is very similar to those of *L. Bootanicus* and *L. (olim Bacteria) Baucis* (confer Wood-Mason in J. A. S. B., 1875, p. 217). The four whitish bodies described by Westwood (with probably nothing but a dried specimen for observation) as metathoracic and mesothoracic tubercles turn out to be very minute rudiments of tegmina and wings, which are represented in the female by small yellow blotches only. Similarly, the tubercles faithfully represented by Westwood in his figure, but not mentioned by him in his description of *Lonchodes virgea*, are rudiments of organs of flight ; this species should be removed from the genus *Lonchodes* to its proper place next to *Phib. acanthopus*.

HAB. *L. porus* occurs abundantly throughout the valley of the Houg-da-ran, Upper Tenasserim ; many individuals of both sexes in all stages of development having been sent up by Mr. Limborg.

The species forms with *Lopaphus Iolas*, *Lonchodes Baucis*, and *Lonchodes Bootanicus*, a series of most closely allied forms showing in a most instructive and conclusive manner the utter valuelessness of the presence or absence of wings as a generic character in this family of orthopterous insects.

## BACILLUS HISPIDULUS, var.

*Bacillus hispidulus*, Wood-Mason, J. A. S. B., 1873, Vol. XLII, p. 47, pl. VII, fig. 2 et 3 ♂ ♀.

Longer and slenderer and with much longer legs than the type specimens from the Andamans. The specimen mentioned on page 48, *loc. supra cit.*, agrees with the males and was probably also from the neighbourhood of Moulmein.

HAB. Abundant throughout the valley of the Houng-da-rau.

Obs.—*B. hispidulus* ♂ is very nearly allied to *B. Souehongia*, Westw., but differs in not having the posterior angles of the penultimate dorsal abdominal segment acuminate, in its feebly forcipated anal cerci, etc.

## LEPIDOPTERA.

## Fam. MORPHIDÆ.

## THAUMANTIS LOUISA, n. sp.

*Th. alis supra albis, anticis dimidio basali, posticis partibus duabus basalibus lætissime et purissime fulvis; singulis, ut in Th. Howqua, fasciâ submarginali lunularum cum maculis hastatiformibus coalitarum saturatissimè violaceo-fusca, ornatis; lunulis maculisque alarum posticarum valdè majoribus: alis infra luteo-fulvis, anticarum parte media sola alba luteo vix tincta; strigis quatuor sinuatis, duabus basalibus saturate brunneis, alterisque duabus submarginalibus obsoletis et tantum ad angulum analem brunneo-coloratis; anticarum ocellis omnibus (5) obsoletis, posticarum autem duobus (intermediis tribus obsoletis) rufis pupilla alba, iride tenui nigra.*

*Expans. alarum antic. unc. 5 lin. 3.*

*Habitat in Tenasserim in montibus "Taoo" dictis ad alt. 3—6000 ped. O. Limborg detexit.*

This fine and distinct species belongs to the same division of the genus as *Th. Cumadeva*, *Th. Nourmahal*, *Th. Cambodia*, and *Th. Howqua*, to the last of which it is most nearly related, but from which it differs in having the upper surface of the wings white and fulvous instead of fulvous throughout, and in having five spots instead of ocelli on the under-surface of the fore wings and only two well-developed ocelli on the hinder wings, instead of three and five respectively.

Dr. RÁJENDRALÁLA MITRA exhibited to the meeting plaster casts of the celebrated Háthigumphá inscription at Udayagiri, and submitted a revised reading and translation of that record. He said, he was indebted to his friend Mr. H. H. Locke of the Calcutta School of Art for the opportunity of reading the record and of exhibiting the casts, which had been prepared under the immediate superintendence of Mr. Locke, at the cost of

General Cunningham, to whom they belonged. They were the most perfect specimens of the kind of work that, under the peculiar circumstances of the case, could be expected. The inscription included seventeen lines of the most ancient Páli character, and, in language, was closely allied to the edicts of Aśoka. It was recorded on the living rock above the entrance of a large natural cavern extended by art, and covered an area of over 84 square feet; each letter measuring about two inches in length. The entrance was from 5 to 10 feet high, and the monument was recorded on the highest point. The rock was of soft sandstone, and the surface on which the inscription was engraved had suffered greatly from exposure to the weather for the last two thousand two hundred years. The surface was very rough, and in many places had peeled off, causing serious lacunæ in the record. The only access to the record could be had by putting up a scaffolding, and even then the moss on its surface caused serious difficulty in the way of reading it. The surface was so uneven that no estampages could be taken that would be worth the trouble.

The record was first brought to the notice of antiquarians by Mr. Stirling in his essay on Orissa, published in Volume XV of the *Researches*, but so little was known of the ancient Páli alphabet at the time, that nothing could be made of it. In 1837, Major, (then Lieutenant,) Kittoe, when travelling in search of coal in Orissa, came to the place, and, after great trouble, secured an eye-copy, and from it Prinsep prepared his reading and translation. Speaking of the eye-copy Mr. Prinsep said, "Nothing short of an impression (and from the nature of the rock, an impression was impossible,) could surpass in fidelity Mr. Kittoe's twice compared facsimile," and the praise was well deserved. After a careful comparison of his copy with the cast, Dr. Mitra had found very little in it to take exception to, except in places where the faintness of the engraving or the defective form of the letters had left room for alternative readings. The record had, since Lieutenant Kittoe's time, suffered extensive injury, and many letters, at times eight or ten in one place, which, judging from his facsimile, had been then perfectly clear, were no longer legible.

When Dr. Mitra was at Udayagiri he caused a cast to be taken in plaster of Paris, but by a stupid blunder his assistants forgot to number the different pieces, and so it proved utterly useless. Mr. Locke's cast had been first taken in clay, and from that reversed facsimile casts were made in plaster of Paris. The sections were so taken as to have the last letter of the first section repeated in the one next to it, and the last line of each section was repeated on the section below it, so that even without numbers the sections could not be misplaced. And altogether the work was so done as to be in every way creditable to Mr. Locke's care, diligence, and thorough knowledge of the requirements of the antiquarian.

Mr. Prinsep's translation had been prepared under many disadvantages, and, in concluding what he called his "hurried and imperfect notice," Prinsep deemed it necessary to apologize, for "offering it to the Society in so immature a shape." With the cast before him the speaker therefore thought it advisable to go over the work, and prepare an independent translation, which resulted in many changes and emendations which have materially altered the sense, and given quite a different turn to several salient points of the record, particularly in the first six lines which were in a better state of preservation than the subsequent ones.

The author of the record was one Aira, a usurper, who overthrew the dominion of an ancient king of Kalinga and, himself becoming the sovereign, repaired the city walls, built Chaityas, caused a tank to be excavated, entertained the people with feasting and music, allied himself with the king of a neighbouring hill by marrying his daughter, won over the clergy by rich presents, and had some caves excavated for their use. The most important fact mentioned in the record was the overthrow, by this usurper, of king Nanda of Magadha, and this carried him back to the middle of the fourth century before Christ. It was not distinctly stated which of the nine Nandas he overcame in battle; but assuming the potentate meant to be the last of the line, the time would be a few years before the invasion of India by Alexander the Great in 327 B. C., and make the record the oldest yet found in India. Dr. Mitra was of opinion that the caves referred to by Aira were the Queen's Palace and its surrounding caves, and the reasons on which he based this conclusion he had, he said, given at length in the forthcoming volume of his *Antiquities of Orissa*.

There were three monograms on the record. The first of these was very like the Tántric symbol called *Kurmachakra* or the "tortoise symbol." The second looked like a lamp post, but Dr. Mitra took it for the "bo tree" with a railing round its base. The third was partly like *Swas-tika* and partly the *Nandávarta*, the emblem of the twenty-third Jain, Ara. It was avowedly a Jain emblem; but the Buddhists looked upon it with great veneration, and many of their ancient princes adopted it for the legend of their seals, and impressed it on their coins. In the Tantras of the Hindus it was highly extolled for its mystic virtues. Nor was it confined to India alone, for in its simple form it occurred, according to King's Gnostics, on the oldest Greek coins, on Etruscan vases, on the Newton stone, Aberdeen, on Celtic monuments, and in ecclesiastical sculptures, styled there the Tetragrammaton. Similarly, the Ibis worshippers of Egypt marked with it the sacred vases of their goddess before using them at their rites. It occurred further among the Gnostics; and the Free-Masons had adopted it as one of their mystic symbols. It was the same with the mark recommended to be placed on the forehead of the elect, in Ezekiel, and on the

worshippers of the Persian Mitra. It was likewise a mark placed among the Greeks on the culprits reprieved from death, and affixed on the roll-call of Roman legions against the names of the living. It was the same with the Grammadera, first seen in Greek and Italian pottery (B. C. 700 to 500). In Schliemann's Troy there were several drawings which showed the symbol to have been common enough among the Trojans. It had been also met with on Scandinavian gold ornaments of the Bronze period. A modification of it was the distinctive badge of *Xaca Japonicus*, and the *crux ansata* and the *sistrum* were allied to it. Persons were not wanting who fancied the European coronation orb to be closely related to this mystic cross. Dr. Inman took it to be a Phallic symbol, and Max Müller thought it to be the monogram of man. That it was intimately connected with the pre-Christian cross, none who had studied the history of ancient symbols would for a moment deny.

The following is a copy of his revised translation.

Line 1. Salutation to those who have overcome all human passions *i. e.*, Arhats ; salutation to all who have attained perfection.

By Aira, the great king, who has a mighty elephant for his vehicle, who has lavished his wealth in erecting Chaityas, who is distinguished by the attributes of Śākya, who is renowned for having looted the earth to its outermost limits, who is the sovereign of Kalinga, has this hill been excavated.

Line 2. Having devoted fifteen years to juvenile pastimes, and nine years to the acquisition of (different) forms of writing, arithmetic, civil polity and laws, he, (Aira) wishing to be a king, with a giant's vigour and an endless army, becoming victorious in the third

Line 3. Battle in the capital of the Royal dynasty of Kalinga, receives royal unction.

Devoted to the duty of kings he causes the gates, walls and houses (of the city ? or of the palace ?) which had been destroyed by the rain and wind, to be repaired.

In the city of Kalinga, a lake (with water) refreshing as the moon-beam and a ghat and many roads for all kinds of equipages, he causes to be

Line 4. Consecrated. He causes the gratification of hundreds of thousands of his subjects whose heads are bent down in salutation.

In the second year (of his reign), reflecting on his interest, he causes to be placed on the west side (strong detachments of) horses, elephants men, war-chariots, and pike-bearers.

For (the gratification of) those who came from Kañsa forest to behold (the rejoicings) as also for that of the inhabitants of the town of Tānasiko, on the following year,

Line 5. He causes to be celebrated an entertainment with the music

of dampana, tabhata and other musical instruments by persons proficient in the science of music, and a dramatic performance by dancing girls.

Next, in the fourth year, in the house of the learned (he calls together ?) the Arhats who had been established by the king of the city of Eastern Kalinga. Impelled by devotion to acts of religion the forsaken umbrellas—a hundred

Line 6. Urns full of jewels, which inimical kings had given up to him, he causes to be offered (to the gods ?).

Now in the fifth year, king Nanda having been by him expelled from home, went away on a swift horse to the city of Punádi—

Line 7. He munificently distributes in charity many hundred thousand (panas)—a hundred—town, territory—governs well. In the eighth year—his mind—hill—

Line 8. (To) the prince who caused (its) destruction he ordains the pain of the cavern (imprisons in one of the caves ?) and causes the murderer to labour by a generous requital. Seated on the hill,—lavishes bland speeches and (receives ?) obeisance—

Line 9. Apes, bulls, horses, elephants, buffaloes and all requisites for the furniture of the house—to induce the practice of rejecting improper persons, he further bestows (or appoints) attendants of the baiman caste (Brahmaṇa ?)—

Line 10. The highly renowned king causes to be made the palace of fifteen victories—

Line 11. Finding no glory in the capital which had been the seat of the ancient kings, a city abounding in envy and hypocrisy, and reflecting, in the thirteenth year—the fall of heavenly forms—twelve.

Line 12. For the profuse profit of crowded congregations he established—Magadha kings,—well governed—since Nanda Rájá's —

Line 13. He distributed much gold at Benares,—he gives in charity innumerable and most precious jewels—

Line 14. In the thirteenth year—married the daughter of the so-called conqueror of the mountains (a hill rájá,)—impelled by virtue of Arhats—

Line 15. By him on a hundred sides—before perfected being, and crowds of people—wealth—

Line 16. He causes to be constructed subterranean chambers, caves containing a Chaitya temple and pillars—for congregations—king of Ayama—kings of Surasena—caves.

Line 17. For whom the happy heretics continually prays, having a lakh of equipages—the fearless sovereign of many hills by the sun-cherished the great conqueror of the ocean shore—

The following papers were read:—

1. *On the Metád Rat, with a note on Golunda Elliotti.*—By W. T.

BLANFORD, F. R. S.

(Abstract.)

The genus *Golunda* of Gray was originally proposed for two species; *G. Elliotti*, already described in the Journal last year and *G. mettada*, (the specific name being evidently a misreading or misprint for *mettada*.) the subject of the present notice. This rat is very rare in collections, but Mr. Fairbank of Ahmednagar has, after a considerable amount of trouble, succeeded in obtaining several specimens, and an examination of these shew that the animal has none of the cranial or dental peculiarities of *Golunda Elliotti*, and that there is no reason for removing the metád from the genus *Mus*. A description and figures of the head, skull, teeth, &c., are given. Some measurements of fresh specimens of *G. Elliotti* are added, together with the synonymy of both species.

The paper will be printed in the Journal, Part II.

2. *Description of new Species of Asiatic Shrews in the Indian Museum.*—

By DR. J. ANDERSON.

This paper will be printed in the Journal, Part II.

3. *Notes on certain Mammals occurring in the Basin of the Máhanadi.*—

By V. BALL, M. A., F. G. S.

The following brief notes refer only to those species whose occurrence in the above named area has not been previously recorded, or regarding which any unpublished facts in reference to distribution have come under my notice.

It would not subserve any useful purpose at present to attempt to give a general list of the Mammal fauna, as the larger animals of wide range are well known to inhabit this part of the country and the Micro-Mammalia have only been partially collected.

TUPAIA ELLIOTTI, Waterhouse.

In the Proceedings for April 1874 I recorded having met with the Madras Tree-Shrew in the Sátápúra hills and also that it had been received from Monghyr. Since that time it has been recorded from Matheran by Major Hayes Lloyd and it is mentioned by Dr. Gunther as having been obtained by Capt. Beavan in Mánbhúm.

In 1876 I met with it several times in Sambálpur, not unfrequently it passed me during beats for large game, and on one occasion I picked up a dead specimen which I found early one morning lying at the foot of a tree. Save for a small quantity of blood about the mouth, this specimen shewed

no external sign of injury. On several occasions during the past season (1876-7) I have met with these small animals. They seemed to be most abundant in a large *Sal* forest on the northern boundary of Jaipur (Vizágapatam District). In Karial (Raipur District) as in Sambalpur, I found one dead early one morning last April. It had several wounds on its body which were, I think, most probably, the result of an encounter with an owl or other *raptor*. The testes were largely developed—possibly it may have been killed by another male. The measurements of this specimen were. ♂ Length of body 6"5; tail 7"5 = 14".

#### FELIS JUBATA, Schre.

The sole evidence that I have of the occurrence of the hunting leopard is the fact that I saw a skin of one which was brought to the Sambalpur treasury for the Government reward. Unfortunately at the time I saw it it was not possible to trace the history of this skin, but it was in so good a condition that it did not seem probable to me that it had been brought by a native traveller from a long distance.

I may add that on one occasion in Rairakhol I got a brief glance at a leopard in the jungle which, from its light colour and erect carriage, I thought might possibly belong to this species.

Quite recently I have received information from Mr. F. C. Berry, C. S., of a melanoid specimen of *F. pardus* (*F. Melas*, Perron), having been shot in Sambalpur.

#### PTEROMYS ORAL, Tickell, *P. Petaurista*, Pallas *apud* Jerdon.

Although the brown Flying Squirrel is known to occur in the forests of Chota Nagpur and the Central Provinces I have, on account of its nocturnal habits, only once actually seen it. The occasion was one evening last April when after sunset I saw what I took to be the ordinary large red squirrel laboriously clambering up to the topmost branches of a large tree. Calling for my gun it was put into my hands just as the true nature of the animal was declared by its soaring off towards some bushes. On my shooting it the people expressed much astonishment and the Raja of Karial, near whose house I shot it, declared he had never heard of such a 'bird' before.

Karial adjoins Bastar where this species was observed by Dr. Jerdon. Mr. Blanford, I believe, obtained it near the Godáviri and recently I have heard of its having been shot on Parisnáth Hill.

The colours of the Karial specimen when quite fresh were as follows:—I give them as there appears to be some difference of opinion as to the true coloration.

♂ *Above*. The hairs black, tipped with grey giving a general hoary appearance. Feet and prolonged toe which supports the parachute—black.





So far as I have been able to ascertain there is no authentic case of a Rhinoceros ever having been observed in the forest region bordering the Máhanadi. It has occurred to me as possible that the rumour may have got abroad from the fact of there having formerly been tame specimens in the possession of some of the Rajas.

At Burpali in the Dakin-tir of Sambalpur the Raja told me that on the occasion of a marriage between a daughter of one of his ancestors and the Bamra Raja, the bride's dowry had been a Rhinoceros, which before that had for some years been kept at Barpali.

In Patna (Sambalpur) I met with an old Cabuli who had retired from his former business as a trader. He told me that one of his speculations was a Rhinoceros which he purchased in Calcutta and marched down offering it for sale to various Rajas *en route* till he reached Jaipur, where he disposed of it for Rs. 11,000 which sum, however, he said, he never received.

It is perhaps unnecessary to state that it is unadvisable to believe all that one hears from the people at the head quarters of these states though the lower classes of the population may be truthful enough. But I shall mention one example of an untruthful statement. A friend of mine shewed me a live specimen of a Cockatoo which he had received from one of these Rajas who assured him it had been caught in his own district. My friend, whose ornithological knowledge was limited, was expecting a further supply of the birds which the Raja promised to have captured for him during the rains when, according to their annual custom, they visited his jungles.

In conclusion I do not know of any cover or grazing grounds in the vicinity of the Máhanadi between Cuttack and Sambalpur suitable for a Rhinoceros. The bed of the river is either rocky or sandy, and marshy *jheels* occur but seldom in its neighbourhood and are then, in all cases, of small extent.

#### AXIS PORCINUS, Linn.

During the present year, in the Jaipur District, I saw a single specimen of the Hog-deer. I had a good view of it as, owing to its horns, being in velvet, it had come out to the edge of the jungle to feed in the day time. The species must, I think, be rare as I understood from Capt. Blaxland, the Assistant Agent, that he had never either seen or heard of it. A large collection of horns brought in by the natives did not include any of this species. In Chota Nagpur I do not know of its occurrence.

#### ANTILOPE CERVICAPRA, Pallas.

The Antelope is very sparingly distributed throughout this area. At Barwa in Palamow near the sources of the Sunk and Koel rivers there is a large herd and further west, in Sirguja, outside the present limits, I have met with several distinct colonies. But to the south of the Máhanadi I

only know of three localities where they exist at present. One is on the borders of Kalahandi and Ganjam where I have heard that they are somewhat abundant. The second locality is near Dulapur on the Ong river in the Dakin-tir of Sambalpur where there is a very small herd. The third locality is 150 miles further south near Omerkote on the Jaipur plateau where also the herd is but a small one. According to Colonel Tickell there were a few formerly in the open parts of Singhbhúm. These have now, I believe, been wholly exterminated.

*Gazella Bennettii* does not occur so, far as I know, in this area, but I have seen it in the extreme west of Sirgúja, whence probably it extends steadily to the Sátপুরas where it is not uncommon.

Mr. W. T. BLANFORD said, that he had heard the same explanation as that furnished by Mr. Ball for the asserted occurrence of rhinoceros wild in the Máhanadi country, and he agreed with Mr. Ball in believing that no wild rhinoceros had been found in that part of India in recent times.

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### LIBRARY.

The following additions have been made to the Library since the Meeting held in June last.

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No. 73. *E. Loomis*.—Contributions to Meteorology, being results derived from an examination of the observations of the United States Signal Service, and from other sources.

No. 74. *J. B. James*.—Principles of Compensation in Chronometers. *Asa Gray*.—Notice of Darwin on the Effects of Cross and Self-Fertilization in the Vegetable Kingdom.

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*M. J. M. Gauguin*.—Mémoire sur la distribution du magnétisme dans les électro-aimants. *M. J. L. Soret*.—Spectroscope à oculaire fluorescent.

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No. 20. *M. J. Guérin*.—Troisième mémoire sur l'origine et la nature de la fièvre typhoïde. *M. Tacchini*.—Sur les taches solaires. *M. E. Guignet*.—Transformation directe du travail mécanique en électricité. *M. Gayat*.—Sur la conjonctivite granuleuse en Égypte; résumé d'une suite d'observations relatives aux ophthalmies du nord de l'Afrique.

No. 21. *M. P. Bert*.—De l'emploi de l'oxygène à haute tension comme procédé d'investigation physiologique des venins et des virus. *M. Langley*.—Nouvelle méthode spectroscopique. *M. G. Hayem*.—Des caractères anatomiques du sang chez le nouveau-né pendant les premiers jours de la vie.

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Liv. 2. *M. Cuéval-Clarigny*.—L'Asie Centrale et le reveil de la question d'Orient.

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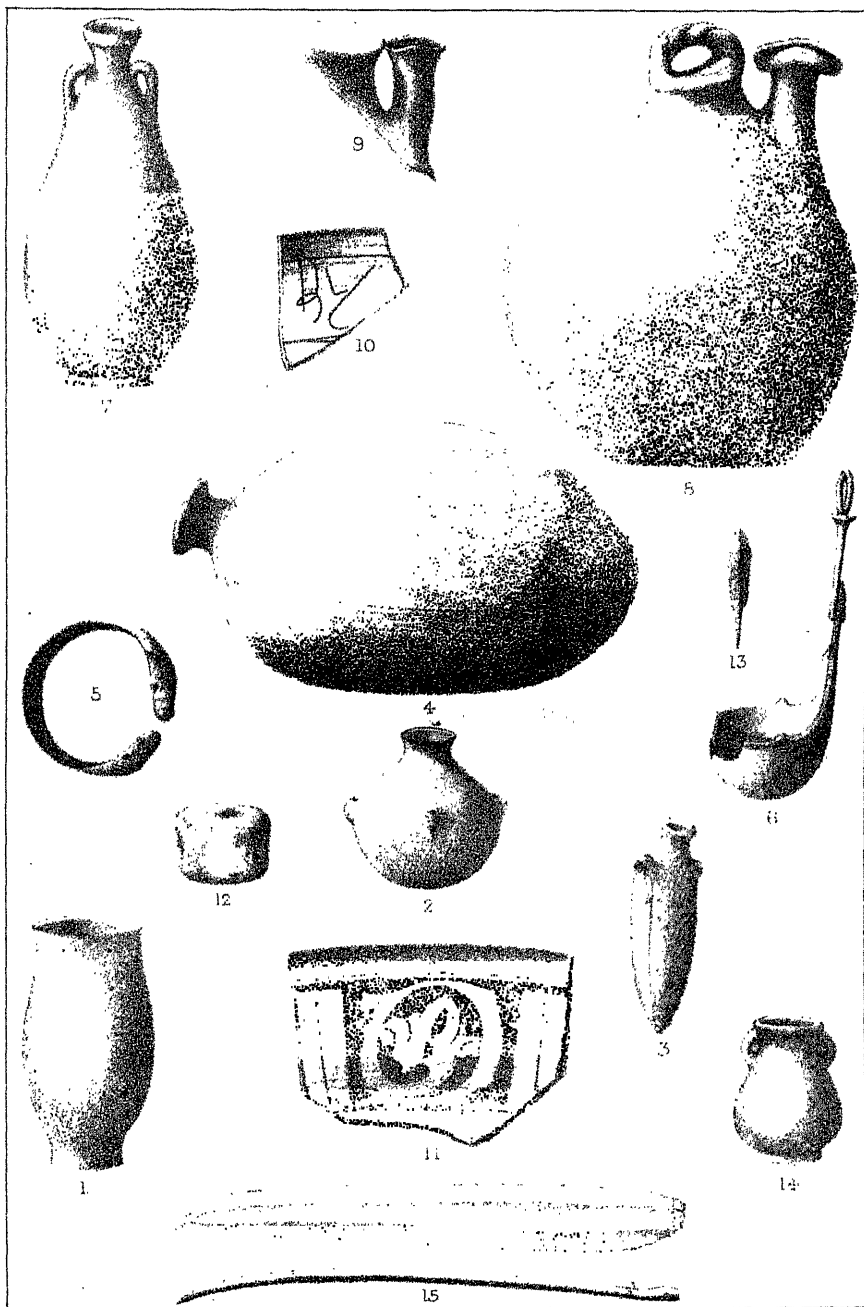
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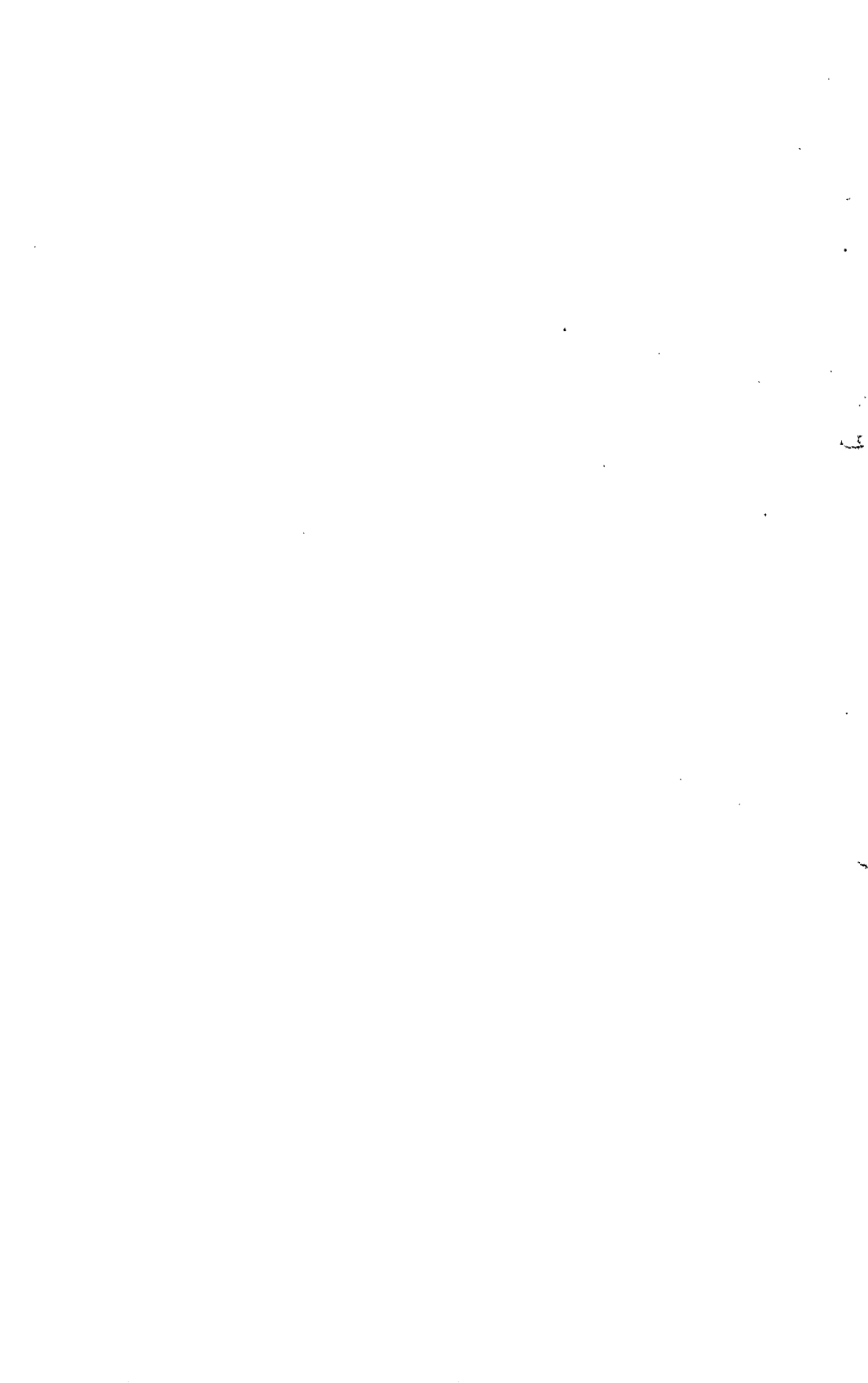
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ANCIENT POTTERY, &c., FROM BALUCHISTAN.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1877.

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The Monthly General Meeting of the Asiatic Society was held on Wednesday, the 1st August, 1877, at 9 o'clock P. M.

RAI RÁJENDRALÁLA MITRA, BAHÁDÚR, LL. D., Vice-President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced :—

1. From the Author, a copy of his Report on the preparations for, and observations of, the Transit of Venus, as seen at Roorkee and Lahore, on December 8th, 1874. By Colonel J. F. Tennant, R. E., F. R. S.

2. From the Author, a copy of his work, The Lord's Prayer translated into the Bôjingtjida; or South Andaman (Etákábêada) Language, by E. H. Man.

The following gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected ordinary Members—

Dr. S. T. Peters.

J. C. Reeves, Esq.

Bábu Mahara Chandra Vrata.

The following are candidates for ballot at the next Meeting—

Bábu Pratápanaráyana Siñha, Deputy Magistrate, Jehánabád, proposed by Bábu Pratápachandra Ghosha, seconded by H. Blochmann, Esq.

Bábu Jnánendrachandra Ghosha, Calcutta, proposed by Bábu Pratápachandra Ghosha, seconded by H. Blochmann, Esq.

Bábu Kedaranátha Datta, proposed by Bábu Pratápachandra Ghosha, seconded by H. Blochmann, Esq.

Captain H. W. Clarke, R. E., Calcutta, proposed by Captain J. Waterhouse, seconded by H. Blochmann, Esq.

W. Duff Bruce, Esq., and Colonel A. D. Vanrenen have intimated their desire to withdraw from the Society.

The SECRETARY reported to the Meeting that Mr. J. D. Tremlett had compounded for his future subscriptions on payment of Rs. 140 after 16 years' Membership.

The CHAIRMAN read the following letter from Dr. H. Oldenburg of Berlin relating to a new edition of the *Vinayapīṭakam*, and stated that the Council had agreed to subscribe for two copies.

"I desire to lay before the Asiatic Society of Bengal the following prospectus of an edition of the *Vinayapīṭakam*.

"A chief difficulty in the investigation of the origin and early history of Indian Buddhism results from the fact, that the principal works of Buddhism have not yet been published, or are published only in short extracts and fragments. It is my opinion, that the *Vinayapīṭakam* in the Pāli recension (comprehending the five works *Pārājīkam*, *Pācittiyaṃ*, *Mahāvagga*, *Cūlavagga* and *Parivāra*) holds the first place among those works which deserve our attention from an historical point of view. The critical investigation of the life of Gautama Buddha, which has lately been undertaken by M. Senart, will then only have a firm foundation, when it is possible to compare the data of the *Mahāvagga* on the one hand and those of the *Suttas* on the other with those of the northern Buddhists, and so to follow the gradual growth of the Buddha legend. In the same manner it must be of the highest importance to compare the principles of Gautama's teaching in the form they assume in the *Suttas* with the form preserved in the *Mahāvagga*. The *Pārājīkam* and the other works relating to ecclesiastical matters will be of great service in the investigation of the historical credibility of the Mahāvāṇsa and the Dīpavaṇsa chronicles. The data there given regarding the Councils and Schisms of the first centuries of Buddhism will receive support or correction from these writings; and the result of this comparison cannot fail to throw some light on the much debated question of the difference between the Northern and the Southern accounts of the councils. Finally it must be interesting to compare the legislative contents of the *Vinayapīṭakam* from Magadha with the corresponding and nearly contemporaneous data from Brahmanical sources in the literature of the Vedic Sūtras from the more westerly Aryavarta. Without doubt new conclusions will result from this comparative study, and such a study is impossible till the text of the *Vinayapīṭakam* is accessible in a published form.

"I intend to publish the *Vinayapīṭakam* giving the Pāli text in English letters without adding anything else but a selection from the various readings, which arise from the differences of the Sinhalese and the Burmese MSS.,

and an index. The Pāli collections of the London and Paris libraries suffice for constituting my text. Any notes that may be deemed necessary, will be in English. The work will consist of 5 volumes of together 1900 to 2000 pages, taking as a model the size of Childer's edition of the *Mahāpari-nibbānasuttam* in the Journal of the Royal Asiatic Society for Great Britain and Ireland. The printing expenses will amount to about £600. Messrs. Williams and Norgate, (Henrietta Street, London) have consented to undertake the publishing, if the greater part of this sum can be covered by subventions or subscriptions. The price of a copy will be £3. If the sufficient part of the expenses can be covered, the first volume will be published probably at the middle of next year, and the whole work will be finished after three or four years.

"I venture to appeal to the Society, which has already done so much to encourage Oriental learning, to afford me such assistance as they shall think that the present undertaking may deserve."

Dr. RĀJENDRALĀLA MITRA submitted a copy of the first part of a descriptive Catalogue of Sanskrit MSS. in the Society's Library, prepared under his superintendence and edited by him. It contained full notices of all the works on Sanskrit grammar belonging to the Society. In submitting it, he desired to call the special attention of the members to the MS. treasures of the Society. To those, he said, who were familiar with the great national libraries of Europe, the Society's Library cannot but appear poor. Instead of lacs, it comprised only from 15 to 20 thousand volumes, and almost every branch of the library was more or less deficient. The books, however, had been very carefully selected, and, in connexion with oriental studies, there was very little of real value that was not available to the members. The library, however, was particularly rich in MSS. Of Arabic works there were 1316 codices, of Persian 1549, and of Urdu 399, making a total of 3264. The collection of Pāli and Burmese MSS. included nearly five hundred palm-leaf records. Of old Tibetan xylographs, which were quite as valuable and scarce as MSS., there were upwards of 2000 separate works, and the Chinese collection included nearly four hundred ancient texts. There was then a collection of 3,700 Sanskrit codices, making altogether a total, the like of which could not be had in any other public or quasi-public library in India. Some of the MSS. were very old and remarkably correct; a few were positively unique. The value of the collection was, however, as regards the members very much impaired by the absence of good catalogues. There were nominal lists, but they were extremely troublesome to consult, and even such lists did not exist of all the MSS. Attempts had been made from time to time to supply better helps, but owing to some cause or other they had to be given up. As regards the Sanskrit codices, Dr. Mitra



was glad to observe that considerable advance had been made. Notices of nearly 1200 MSS. had been prepared in Sanskrit, and, if some of those members who took an interest in the ancient classics of India, would turn their attention to the subject, and superintend the translation and publication of those notices, the work, the first part of which he had the honor to submit to the meeting, could be brought to an early completion. He was glad also to announce that he had on hand an analysis of the very valuable Sanskrit Buddhist MSS. which had been brought from Nepal by their distinguished associate Mr. B. H. Hodgson, and four forms of the work were already in type.

The following papers were read :—

1. *A theoretical deduction of the best Resistance of a Telegraph Receiving Instrument.*—By R. S. BROUGH.

The information given in the text-books regarding the proper resistance of an electro-magnetic receiving instrument to employ on any Telegraphic circuit is meagre and indefinite. The authors usually content themselves with saying that on short circuits the instruments should be wound with thick wire, while on long circuits they should be wound with fine wire.

Professor Fleeming Jenkin in his "Electricity and Magnetism", however, states that the resistance of the receiving instrument should not be more than a moderate fraction of the resistance of the whole circuit. In a foot note he adds that some authority (un-named) recommends that the resistance of the receiving instrument should be  $\frac{5}{16}$  of that of the whole circuit, and remarks that this appears to be a very large value.

Mr. Schwendler in his "Testing Instructions", published under the authority of the Director General of Telegraphs in India, taking into consideration the influence of want of perfect insulation of the line wire, deduces that the resistance of the receiving instrument should be  $\frac{5}{8}$  of that of the line wire.

The fact of the matter is that on comparatively short lines, and at low speeds of signalling (say 12 words per minute) the resistance of the receiving instrument is not of much importance, as deficiency of sensibility can be compensated by increased battery power, and the circuit will appear to work equally satisfactorily whether the resistance of the receiving instrument be 500 or 2500 ohms.

In such cases the general rule given in the Text Books is sufficient for practical purposes.

When we come, however, to the case of high-speed signalling,\* or

\* For high-speed Telegraphy, electro-magnetic receivers are being superseded by electro-chemical receivers, which are free from mechanical and magnetical inertia.

of very long and highly insulated lines, the question assumes a different phase and becomes one of great importance.

Now the best resistance for an electromagnet to be employed as a receiving instrument on any line has to be considered from two aspects, which may fitly be referred to as the "static" and the "kinetic."

Considered under the first aspect the problem is a purely static one: it is to find the resistance of the receiving instrument, which will make its magnetic force a maximum, when a steady current is flowing from the sending to the receiving station. By a steady current is meant one which does not vary in strength with respect to time. This problem is completely solved and thoroughly understood.

It can be shewn\* that the magnetic force is a maximum for

$$r = \sqrt{ki} \left\{ \frac{\begin{matrix} -2l\sqrt{\frac{k}{i}} & -2l\sqrt{\frac{k}{i}} \\ \sqrt{ki}(1-\epsilon) & +f(1+\epsilon) \end{matrix}}{\begin{matrix} -2l\sqrt{\frac{k}{i}} & -2l\sqrt{\frac{k}{i}} \\ \sqrt{ki}(1+\epsilon) & +f(1-\epsilon) \end{matrix}} \right\}$$

Where  $r$  = resistance of receiving instrument.

$f$  = " " battery.

$k$ † = " " conduction per unit of length.

$i$ † = " " insulation " " " "

and  $l$  = length " line.

If the resistance  $f$  of the battery may be neglected,

$$r = \sqrt{ki} \frac{1-\epsilon}{1+\epsilon} - 2l\sqrt{\frac{k}{i}}$$

= measured resistance of line with its distant end to earth.

\* Blavier, *Annales Télégraphiques*, 1858, p. 234.

† Let  $A$  = measured insulation of line: distant end-insulated.

And  $B$  = " conduction, " " : " " to earth.

Then  $k = \frac{\sqrt{AB}}{2l} \log_e \frac{\sqrt{A} + \sqrt{B}}{\sqrt{A} - \sqrt{B}}$

And  $i = \frac{AB}{k}$ .

From this value of  $r$  a considerable reduction has to be made, on account of the thickness of the insulating covering of the wire in the receiving instrument, according to the formula:\*

$$\frac{\text{Resistance of receiving instrument}}{\text{External resistance}} = \frac{\text{Diameter of bare wire}}{\text{Diameter of covered wire}}$$

Considered under the second aspect the problem is a kinetic one. Here the current is not assumed to be steady; but the influence of the resistance of the receiving instrument on the rapidity of the variation of the potential of the line is considered, that is to say, its influence on the speed of signalling, since signalling is simply causing the potential at the receiving end of the line to vary in some preconcerted manner. This problem has never been completely solved.

Sir William Thomson, however, has shewn that when the resistance of the receiving instrument is not very great as compared with the resistance of a perfectly insulated line, its effect is the same on the speed of signalling as if the line had been lengthened by a piece whose resistance would be equal to that of the receiving instrument.

Sir William Thomson has further shewn that the speed of signalling on any line depends on the value for that line of a certain constant, which may be called the "retardation characteristic" of the line, and the expression for which is

$$RC = \frac{k c l^2}{\pi^2} \log_e \left( \frac{4}{3} \right)$$

where  $k$  is the resistance and  $c$  the capacity of the line per mile, and  $l$  is the length of the line in miles.

Now we see that the value of the  $RC$  increases as the square of the length of the line, and since by increasing the resistance of the receiving instrument we virtually increase the length of the line, it is perfectly obvious that if we make the resistance of the receiving instrument unduly high we may increase the value of the  $RC$  to such an extent as to impair the signalling speed of the line.

It thus becomes clear that in the case of a very *long* and *highly insulated* line the best resistance for the receiving instrument, as indicated by the result obtained by examining the problem under the first aspect only, may be so great as to retard the speed of signalling.

I shall here consider only the case of a perfectly insulated line.

Let  $l$  = the length of the line in miles

$k$  = resistance per mile in ohms (supposed uniform)

$c$  = capacity per mile in farads (ditto)

and  $r$  = the resistance in ohms of the receiving instrument.

\* See Proceedings, Asiatic Society of Bengal, June, 1877.

Then the sensibility of the receiving instrument is :

$$M = \text{Const.} \times \frac{\sqrt{r}}{r + k l}$$

And assuming that the intercalation of the receiving instrument of resistance  $r$  in circuit has approximately the same influence on the signalling speed as increasing the length of the line by  $\frac{r}{k}$  miles, we have

$$RC = \text{Const.} \times \frac{k c \left( l + \frac{r}{k} \right)^2}{\pi^2} \log_{\epsilon} \left( \frac{4}{3} \right)$$

Now, if it may be assumed that the efficiency of the receiving instrument varies directly as its sensibility, but inversely as its retardative influence, then we have the following expression for the efficiency, namely :

$$\begin{aligned} RE &= \text{Const.} \times \frac{\pi^2 \sqrt{r}}{k c \left( l + \frac{r}{k} \right)^2 (r + k l) \log_{\epsilon} \left( \frac{4}{3} \right)} \\ &= \text{Const.} \times \frac{\sqrt{r}}{(r + k l)^2} \end{aligned}$$

which is a maximum for

$$r = \frac{k l}{5}$$

that is, the resistance of the receiving instrument in the case of a perfectly insulated and uniform line should be one-fifth of the resistance of the line.\*

Taking into consideration the resistance of the signalling battery, which has hitherto been neglected, the result is modified as follows.

Suppose we are given a certain number of cells (all of equal electromotive force and resistance) and arrange them so that the total resistance of the battery =  $f$ , then it may easily be shewn that the total electromotive force of the battery will be proportional to  $\sqrt{f}$

Thus the expression for the sensibility of the receiving instrument becomes (employing the same notation as before)

$$M = \text{Const.} \times \frac{\sqrt{f r}}{f + r + k l}$$

and the expression for the retardation characteristic becomes

$$RC = \text{Const.} \times \frac{k c \left( l + \frac{f + r}{k} \right)^2}{\pi^2} \log_{\epsilon} \left( \frac{4}{3} \right)$$

and finally, the expression for the receiving efficiency of the instrument becomes,

\* Singularly enough, this is the precise value selected, on experimental grounds, by Prof. Hughes.

$$RE = \text{Const.} \times \frac{\sqrt{fr}}{(f + r + kl)^2}$$

which has a maximum both with respect to  $f$  and to  $r$ , namely, for:—

$$\left. \begin{aligned} r &= \frac{1}{2} (f + kl) \\ f &= \frac{1}{2} (r + kl) \end{aligned} \right\}$$

These maxima conditions are simultaneously fulfilled by:—

$$r = f = \frac{1}{2} kl.$$

2. *Notes on the Mammalian Fauna of the Wardwán and Upper Chenáb Valleys*.—By R. LYDEKKER, B. A., *Geological Survey of India*.

(Abstract.)

In this paper notes are given of several mammals inhabiting the Wardwán and Upper Chenáb valleys, south-east of Kashmir. The list is imperfect as scarcely any micro-mammalia, and no bats are mentioned. The following is a list of the species noticed, or the existence of which within the region has been ascertained: *Macacus rhesus*, *Semnopithecus schistaceus*, *Felis pardus*, *F. uncia*, *Ursus isabellinus*, *U. Tibetanus*, *Canis (vulpes) montanus*, and another large dark-coloured fox, resembling the dark variety of *C. leucopus*, a weasel not identified, but possibly *Mustela kathiah*, *Arctomys Himalayanus*, *Lagomys Roylei*, *Pteromys inornatus*, *Moschus moschiferus*, *Hemitragus jemlaicus*, *Nemorhædus goral*, *Capra sibirica*, *Sus indicus*. A tiger is said to have been killed in the Wardwán valley, and *Cervus Cashmerianus* is occasionally found on the Kashmir side of the river, but it does not cross to the opposite bank.

Of the animals named, four species, viz., *Felis uncia*, *Canis montanus*, *Arctomys Himalayanus*, and *Capra sibirica* belong to the Tibetan fauna.

Mr. W. T. BLANFORD said—it was very important to have accurate lists of animals inhabiting various localities, as it was impossible to determine questions of distribution without a better knowledge of the range of species than we now possess. Such lists are peculiarly interesting when, as in the present case, they refer to a locality on the limits of two different great regions; the Wardwán and Chenáb valleys being on the confines of the Tibetan province, belonging to the Palæarctic region, and of the Himalayan province, the fauna of which is Oriental.

The large fox mentioned by Mr. Lydekker can scarcely be *V. leucopus*, which is smaller than *V. montanus*. It is more probably the large form of *montanus* found in Tibet and Turkestan, and apparently identical with *V. flavescens*, Gray.

3. *Notes of a pre-historic Burial-place with cruciform Monoliths near Mungapet in the Nizam's Dominions.*—By W. KING, Deputy Superintendent Geological Survey of India.

(Abstract.)

After details of locality, and supposition of possibly previous observation and description, the paper gives an account of an assemblage of about 150 kists encircled by stone rings, with 4 large stone monoliths in the form of crosses.

The kists and crosses are all of dressed stone, the former being of a much higher style of building than is usually seen in the other ring-surrounded kists of S. India which are commonly called Korumbar Rings.

The cruciform monoliths are distinguishable from other crosses of pre-Christian type, by the different size of the limbs, and by the curved junction between the lower limb and the arms. The largest cross is 13 feet long. One of the crosses is still standing in an upright position, with the lower limb buried about 6 feet in the ground.

The tombs consist of four upright slabs, with a covering lid: the entrance being at one side of the wall facing the sun. Inside, there is a floor slab which is hollowed out in one or more cavities or coffin-like receptacles, an arrangement which is quite different to that of the so-called Korumbar rings which usually contain urns either for the bodies in a packed position, or ashes.

The author supposes that in the present example, the bodies were embalmed.

The principal tomb is 9' 6" long by 9' wide, with a covering slab, 14' 8" by 11' 6," and 1' 4" thick at the edge; the whole height being 5 feet. It contains two coffin-like receptacles, with room for a third. The circle of stones enclosing this tomb is 37 feet in diameter.

The several parts of the tombs are each of one stone.

The stone used is that of the locality, a sandstone; and in this the present tombs differ from the ruder Korumbar rings which are usually built of stone fetched from a distance.

Other, but poorer, assemblages of tombs and without crosses, occur on the slopes of the low hills in the neighbouring country.

These relics are without any inscriptions, or incised characters.

The author supposes that this burial-place is of pre-Aryan age, or rather of the Hindo-Kolarian times. This is about the same age as Colonel Glasfurd (who had previously written of other megalithic remains in the neighbouring country) attributes to the relics observed by him, and which he calls Indo-Scythic.

This surmise as to the age rests on the fact that similar, though ruder, remains of the same style (the crosses excepted) occur all over the country,

and northwards into the proper country of the Kolarians who now in Chutia Nagpur still build and use tombs of a like kind; and the more improved style of the Rákshasgúdium tombs is attributed to the highest phase in civilization of the pre-Aryan people, who possibly dwelt here and were absorbed by or amalgamated with the Aryan conquerors.

The supposition of a possibly early Christian origin is met by the non-occurrence of other traces of the cross in the outlying country.

The CHAIRMAN remarked that it was usual to associate with pre-Christian and non-Christian crosses a religious signification. Most writers took them to be mystic symbols, and Mr. Inman and others believed them to be of phallic origin. That in some cases there were religious, or mystic, ideas associated with the cross could not be denied, but he thought it would be unwarrantable to suppose that all crosses were connected with religion. Rude stone crosses of other than Christian origin were met with mostly near cairns, cromlechs and other memorials of the dead, and their object was to attract attention to the grave near which they were placed. For this purpose a rough-hewn shaft, such as could be most easily prepared, would scarcely be distinctive enough; it would be somewhat better than an amorphous one, but it would often pass quite unnoticed. An upright post with a cross bar, or, what would be the same thing, a cross-shaped block, on the other hand, though requiring no great effort of ingenuity to execute, could not fail to attract the attention of the rude primitive people for whom, and by whom, they were set up. Such a sign-post in course of time and frequent usage, would become the usual symbol for a grave. It was the simplest and at the same time the most effective, and so it got a wide currency without any religious or mystic idea being associated with it.

Mr. BALL said that on one occasion, eleven years ago, when in company with Dr. Oldham and Mr. Hughes he remembered to have seen an ancient stone cross in the Hazáribágh district. The precise locality was at Basatpur near Leiyo in the valley of the Bokáro river. He regretted that he possessed no record of the character of the cross; but he had a note to the effect that there were at the same place a number of dressed memorial stones, with a truncate-pyramidal shape, which were marked with series of graves that may possibly have had some signification. All of these, like the rude slabs which are put up in parts of Chutia Nágpur even to the present day, were said to have been the work of Kols.

He hoped this record might be the means of having these remains revisited and properly described. At the time he saw them, he did not attach a proper degree of importance to them, though he remembered that they reminded him of some Celtic remains with which he was familiar.

Mr. W. T. BLANFORD said, he greatly regretted that when in the country to which Mr. King's notes refer, he did not take the opportunity

of visiting the very singular remains described, although he heard of them from Captain Glasfurd, Mr. Vanstavern and others. Despite the very high authority of Mr. Fergusson, he could but agree with Mr. King and the Chairman in thinking it questionable whether the crosses in the Godávári valley have any connection with Christianity. There are two circumstances which should, he thought, be taken into consideration before admitting the Christian origin of these monoliths.

The first has been already noticed by Mr. King; it is the absence of any inscription, of any distinctive sculpture, or of any Christian symbol except the cross. Now a people who were sufficiently civilized to carve and transport monoliths of this size, must, if they were Christians, have been acquainted with the art of writing; and it is inconceivable that they should not have engraved some memorial of the purpose for which the stones were erected.

The second reason is the association of the crosses with cromlechs and stone circles. In the Proceedings of the Society for 1868, besides Mr. Mulheran's description of the crosses and cromlechs on the Godávári, at pp. 116 and 148, there are several notices of cromlechs or kistvaens in Coorg and other parts of India, pp. 151, 184, 243. But no one appears to have called attention to the very remarkable explorations of kistvaens and stone circles in the Southern Marátha country by Captain Meadows Taylor. The details of these explorations were published in the Journal of the Bombay Branch of the Royal Asiatic Society in two papers, one entitled "Ancient Remains at the village of Jimarji near Ferozabad on the Bhima," (Vol. III, Pt. 2, p. 179); the other, "Notices of Cromlechs, Cairns and other ancient Scytho-Druidical remains in the principality of Sorapur", (Vol. IV, p. 380.) In some of the circles stone kists were found containing human skeletons, and, together with the perfect skeletons, were skulls detached from the bodies to which they had belonged, in a manner which appeared to prove that human victims had been sacrificed at the funerals of chiefs. In the kistvaens were found urns with bones which had been subjected to the action of fire.

Now it is not likely that any Christian people either sacrificed slaves or concubines at the tombs of their Chiefs, or that they burned bodies. Is it probable that, after they became Christian, they would so far have preserved their former funeral rites as to bury their dead in cromlechs, or to mark their graves with stone circles? It is of course possible that the crosses may be of later date than the cromlechs, but all observers appear to think the contrary.



4. *Note on two Copper-plate Grants of the Chandel Dynasty of the eleventh and twelfth centuries of the Samvat Era.*—By PANDIT PRÁNNÁTH SARASWATI, M.A., B.L.

(Abstract.)

These two copper-plate grants are of the *Chandel* dynasty, dated Samvat 1055 and 1107, corresponding to the years 998 and 1050 of the Christian era. The Society was indebted for these copper-plates to V. A. Smith, Esq., B. A., B. C. S., who sent the following account of their discovery:

"In 1872 a peasant when ploughing in the lands of Mauza Nanyaurá, Parganá Panwári, Zila Hamírpúr turned up two inscribed copper-plates. The plates were brought to Mr. W. Martin, C. S., who is now on furlough, and were left by him in the hands of a local pundit [Muralidhar of Maudahá, in Hamírpur Zilá] who was in his service. With the assistance of this man I have had Nágrí transcripts prepared, and have made translations of the inscriptions." The first of these, records the grant of certain lands by Sri Dhanga Deva, the Lord of Kálinjara, the son of Yasovarmma and the grandson of Sri Harsha; the recipient of this gift (which was made at Benares on the occasion of an eclipse of the Moon) is mentioned as one Rudra Sri Yasodhara, son of Rudra Jaya Kumára, belonging to the *gōtra* of Bháradvája, the *pravara* of Bháradvája Angirasa and Vrihaspati, a follower of the Vájasaneya *sákhá* of the Yajurveda and an inhabitant of the village तर्कादिका Tarkáyiká.

The second copper-plate records the grant of certain other lands by Deva Varmma Deva, the Lord of Kálinjara, the son of Vijaya Pála Deva and the grandson of Vidyádharma Deva; the recipient of the gift (which was made on the occasion of the annual *shradh* of the donor's mother, the Queen *Bhuvana Deví*) is mentioned as a Brahman by name Abhimanyu, the son of Bhatta Ellá, the grandson of Jayavara, belonging to the *gōtra* of Bháradvája, the *pravara* of Angirasa Vrihaspati and Bháradvája, a follower of the Yajur Veda *sákhá* and an inhabitant of *Takári bhatta gráma* which may be translated to mean the village of *Takári* inhabited by *Bhattas*, i. e. Brahmans learned in the Vedas. Deva Varmma's name is new, not being mentioned, in any of the previously discovered inscriptions or copper-plates, or the annals mentioned in Major-General Cunningham's *Archæological Survey of India*, Vol. II. The name of the Queen-Mother Bhuvana Deví is also new.

Mr. Smith had forwarded transcript and translations of the inscriptions on the copper-plates which I have revised. They will be published, with a detailed Note, in the Society's Journal.

The Pandit then spoke to the following effect:

This concludes the announced programme of the meeting, but before I

resume my seat I hope to be permitted to speak a few words about the agreeable surprise which the Chairman had provided for us. Dr. Rájendralála has laid the Society under many obligations, but his latest labour of love is as valuable as any that preceded it. The work of cataloguing MSS. is no doubt very trying and in the main uninteresting, but the very absence of attractions ought to make us grateful to those who undertake the necessary task. In the midst of an increasing load of years and anxieties, and a multiplicity of avocations and pursuits, the learned Doctor has given an example of perseverance and assiduity which men younger in years would do well to imitate. The author's name was a sufficient guarantee of the value of the work, and I beg to propose that—

The best thanks of the meeting be tendered to Dr. Rájendralála Mitra for the labour of love which he has performed in bringing out the first fasciculus of an improved Catalogue of the Society's Sanskrit MSS.

The motion was seconded by Mr. W. T. Blanford and carried unanimously.

*Note on the Floral simulation of Gongylus gongylodes, Linn.—By Dr. J. ANDERSON, Superintendent Indian Museum, Calcutta.*

Dr. ANDERSON said, that he was indebted to Mr. C. T. Buckland for the opportunity to exhibit some living examples of a very remarkable form of Orthopterous insect. Three of the insects were alike and were probably the females of a fourth insect which, however, differed from them considerably in size and colour, as well as in the absence, or merely rudimentary development of certain leaf-like appendages which are a striking feature in the larger insects. Dr. Anderson expressed regret that, owing to the temporary absence from Calcutta of Mr. Wood-Mason, he was deprived of the special knowledge which Mr. Mason possesses regarding the Orthoptera, as he would possibly have been able to say if all the insects belonged to one species, *i. e.* whether the small brown insect is the male of the larger and green coloured individuals.

These insects, however, all came from the same locality, having been forwarded to Mr. Buckland by Mr. Larymore of the Central Jail at Midnapur. Mr. Larymore had procured them from the neighbouring country district where Santál women and children had hunted them out and brought them in, hanging on branches or twigs of a bush, somewhat like a wild plum tree. They are also said to be found upon rose bushes, and in connection with this it was observed that, in Midnapur, they were known as rose-leaf insects from the circumstance that when the insect is more developed and furnished with wings, the foliaceous appendages are said greatly to increase in size and exactly to resemble rose leaves. Dr. Anderson, however, was disposed to think that more than one species might probably occur in

the Midnapur district, and that these insects with the larger foliaceous expansions might be distinct from the species now before the Society.

Mr. Buckland had made over these insects to Dr. Anderson, and since that time they have been regularly fed upon house-flies and grasshoppers; the latter, however, appear to be rather too strong for them and they therefore prefer the flies. They have been tried with small fragments of plantain and custard-apple which they not only eat, but the juice of which they seem to suck with considerable avidity. Dr. Anderson, however, thought that it was the moisture of these fruits that was the chief attraction to these insects, for the entire character of their organization indicated a rap-torial habit.

Dr. Anderson went on to say that he had succeeded in identifying the three, larger insects by means of a single dried specimen in the Indian Museum which, however, was fully mature and provided with wings. These remarkable insects proved to be the pupæ of a peculiar species of Mantids which was known to Aldrovandus\* who figured it more than a century and a half before the first appearance of the *Systema Nat.* of Linnæus to whom it was known as *Gryllus gongylodes*† and also as *Mantis gongylodes*‡ and since the time of Aldrovandus it had been figured in a variety of works on Natural History, but apparently in every instance from mature, and seemingly from dried specimens, so that the colours of the insect during life had never been correctly described.

So much by way of introduction to these remarkable pupal Mantises, the recognized scientific name of which is *Gongylus gongylodes*, Linn.

The reason which induced Dr. Anderson to bring them to the notice of the Society had now to be pointed out. On looking at the insects from above, they did not exhibit any very striking features beyond the leaf-like expansion of the prothorax and the foliaceous appendages to the limbs, both of which, like the upper surface of the insect, are coloured green, but on turning to the under surface the aspect is entirely different. The leaf-like expansion of the prothorax, instead of being green, is a clear, pale lavender-violet with a faint, pink bloom along the edges of the leaf, so that this portion of the insect has the exact appearance of the corolla of a plant, a floral simulation which is perfected by the presence of a dark, blackish brown spot in its centre, over the prothorax, and which mimics the opening to the tube of a corolla. A favourite position of this insect is to hang head downwards among a mass of green foliage, and, when it does so, it generally remains almost motionless, but, at intervals, evinces a swaying movement as of a flower touched by a gentle breeze, and while in this attitude, with its

\* Ins. tb. 13, fig. 21 (1602); edit. Francft. b. 7, fig. 2, 3 infra (1623).

† Linn. Mus. Ludow. Ulr. 112, 3: Linn. Syst. Nat. H. 1767, 690.

‡ Stoll Spectr. et Mant. fig. 58, 59 ♀; Oliv. Encycl. Ins. VII, 626, 7; fig. 3-5 ♀.

fore limbs, banded violet and black, and drawn up in front of the centre of the corolla, the simulation of a papilionaceous flower is complete. The object of the bright colouring of the under surface of the prothoracic expansion is evident, its purpose being to act as a decoy to insects, which, mistaking it for a corolla, fly directly into the expectant, serrated, sabre-like, raptorial arms of the simulator. It is no new fact that many insects resemble the leaves of plants and trees, and that they manifest forms and colours which serve to protect them in the struggle for existence, but, as far as Dr. Anderson had ascertained, this was the first recorded instance of an insect simulating the corolla of a flower for the evident purpose of attracting insects towards it for its sustenance. It is even more remarkable than this, for it is a localized adaptation for such a purpose, a portion of the insect being so modified in form and colour that the appearance of the corolla of a plant is produced, in conjunction with the remainder of the long attenuated prothorax, which, at a distance, resembles the flower-stem: the anterior limbs when in repose even adding to and heightening the deception.

Mr. W. T. BLANFORD said he thought that the simulation of a flower by this or an allied species of *Mantis* had been noticed by Mr. S. E. Peal, who some years since sent a drawing of the animal to Mr. Wood-Mason. The facts had not, however, Mr. Blanford believed, been published, as Mr. Wood-Mason waited until he could obtain specimens.

The CHAIRMAN announced that the next meeting would be held in November, after the recess.

The following communications have been received—

1. *Three Translations from the Hamāseh.*—By C. J. LYALL, Esq. C. S.
  2. *Note on Khánja Khán Garh near Salímābād, Burdwán.*—By BĀBU GOUR DÁS BAISAKH.
  3. *Metrical Translations from the Quatrains of Umar Khayyám.*—By P. WHALLEY, Esq., C. S.
  4. *Further Proofs of the Monogamy of Kálidása's Heroes.*—By G. S. LEONARD, Esq.
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## LIBRARY.

The following additions have been made to the Library since the Meeting held in July last.

TRANSACTIONS, PROCEEDINGS, AND JOURNALS,  
presented by the respective Societies or Editors.

Batavia. *Natuurkundig Tydschrift voor Nederlandsch-Indië*, uitgegeven door de Koninklijke Natuurkundige Vereening in Nederlandsch-Indië Deelen 84—36.

Bombay. *The Indian Antiquary*,—Vol. 6, Pt. 69, 1877.

*Dr. G. Bühler*.—Eleven land-grants of the Chaulukyas of Anhilvad.

Calcutta. *The Māhabhārat*,—Vol. 1, No. 8, and Vol. 2, No. 9.

———. *The Rāmāyana*,—Vol. 6, No. 2.

London. *The Athenæum*,—Nos. 2590—2593, 1877.

———. *The Geographical Magazine*,—Vol. 6, No. 6, 1877.

*R. Cross*.—The India-Rubber Trees in Brazil.

———. *Nature*,—Vol. 16, Nos. 398—401, 1877.

Lyon. *La Société de Géographie*,—Bulletin, Tome 1, No. 7.

Paris. *La Société de Géographie*,—Bulletin, Avril 1877.

*Ch. Maunoir*.—Rapport sur les travaux de la Société de Géographie et sur les progrès des sciences géographiques pendant l'année 1876. *Du Treuil de Rhins*.—Note sur l'Annam. Extrait d'une lettre adressée au secrétaire général. Voyage de M. Mikloukho-Maklaï dans la presqu'île de Malaisie. Lettre au secrétaire de la Société Russe de Géographie (avec carte dans le texte).

Roorkee. *Professional Papers on Indian Engineering*,—Vol. 6, 2nd Series, No. 25.

*Capt. J. L. Morant*.—Mountain Railway for the Nilgiri Hills. *Capt. A. Cunningham*.—Discharge of Canals. *H. G. McKinney*.—Useful Australian Timbers.

Rome. *Reale Accademia dei Lincei*,—Atti, Vol. 1, Fas. 6, 1877.

*Aruso e Brigidi*.—Intorno alle alterazioni prodotte nell' organismo dall' azione dei bromuri.

Trieste. *Società Adriatica di Scienze naturali*,—Bollettino, Nro. 1, Vol. 3.

Yokohama. *Die Deutsche Gesellschaft für Natur- und Völkerkunde Ostasien's*,—Mittheilungen, Heft. 12, Mai 1877.

## BOOKS AND PAMPHLETS

presented by the Authors.

MAN, E. H. *The Lord's Prayer translated into the Bôjingtjida, or South Andaman (Elakabeäda) Language*. With preface, introduction and notes by Lieut. R. C. Temple. 8vo., Calcutta, 1877.

RÁJENDRALÁLA MITRA, DR. A scheme for the rendering of European Scientific Terms into the Vernaculars of India. Svo., Calcutta, 1877.

TENNANT, J. F., COLONEL. Report on the Preparations for, and Observations of, the Transit of Venus, as seen at Roorkee and Lahore on December 8, 1874. 4to., Calcutta, 1877.

THOMAS, EDWARD. Jainism, or the early faith of Asoka. Pamphlet, 1877.

VON MUELLER F., BARON. Select Plants readily eligible for Industrial Culture or Naturalisation in Victoria, with indications of their Native Countries and some of their Uses. Svo., Victoria, 1876.

### MISCELLANEOUS PRESENTATIONS.

Selections from the Records of the Madras Government, No. 59: Annual Report of the Civil Dispensaries for 1875-76.

THE GOVERNMENT OF MADRAS.

A Catalogue of Sanskrit MSS. existing in Oudh, for the quarter ending 30th September, 1875.

THE GOVERNMENT OF THE N. W. PROVINCES.

Report on the working of the Government Charitable Dispensaries in the Central Provinces for 1876.

Report on the Lunatic Asylums in the Central Provinces for 1876.

CHIEF COMMISSIONER, CENTRAL PROVINCES.

The Fifth Annual Report of the Board of Directors of the Zoological Society of Philadelphia, 1877.

THE SECRETARY,

Report on the Preparations for, and Observations of, the Transit of Venus, as seen at Roorkee and Lahore, on December 8, 1874. By Colonel J. F. Tennant, R. E.

CAPTAIN J. WATERHOUSE.

The African Exploration Fund. Pamphlet.

THE ROYAL GEOGRAPHICAL SOCIETY.

### PERIODICALS PURCHASED.

Berlin. Journal für die reine und angewandte Mathematik,—Band 83, Heft 2, 1877.

L. W. Thomé.—Zur Theorie der linearen Differentialgleichungen.

Calcutta. The Indian Medical Gazette,—Vol. 12, No. 7.

Dr. Max von Pettenkofer.—Nine Propositions bearing on the Ætiology and Prophylaxis of Cholera, deduced from the official Reports of the Cholera Epidemic in East India and North America.

Giessen. Jahresbericht über die Fortschritte der Chemie für 1875, Heft. 3.

Göttingen. Göttingische Gelehrte Anzeigen,—Stücke 22, 23, 25 and 26.

—————. ————— Nachrichten, Nos. 12—14.

Leipzig. Annalen der Physik und Chemie,—Ergänzung Band 8, Stück 3 ;  
Band 160, Stück 4 ; Neue Folge, Band 1, Heft 1—2.

Band 8, Stück 3. *A. L. Holtz*.—Ueber die Magnetisirung ellipsoidischgeformter Eisen und Stahlkörper und die Veränderung des temporären und permanenten Magnetismus. *W. Holtz*.—Einige wesentliche Verbesserungen an einfachen und zusammengesetzten Influenzmaschinen.

Band 160. Stück 4. *P. Glatzel*.—Neue Versuche über die Ausdehnung von Körpern durch die Wärme.

Band 1. Heft 2. *E. Edlund*.—Ueber die electricischen Ströme, welche bei dem Strömen der Flüssigkeiten durch Röhren entstehen. *W. Hankel*.—Ueber das magnetische Verhalten des Nickels und des Kobaltes.

—————. ————— Beiblätter, Band 1, Stücke 5—6.

Stück 5. *Uchatius*.—Ueber die Erhöhung der Elasticitätsgrenze der Metalle durch dauernde Spannung.

Stück 6. *G. Pisati*.—Ueber die Elasticität der Metalle bei verschiedenen Temperaturen. *G. Pisati* und *G. Saporito-Ricca*.—Festigkeit des Eisens bei verschiedenen Temperaturen.

London. The Academy,—Nos. 265, 267—270, 1877.

—————. The Chemical News,—Vol. 35, Nos. 914, 916—918, 1877.

No. 917. The Jablochkoff Electric Candle.

—————. The Society of Arts,—Journal, Vol. 25, Nos. 1280, 1282—1285, 1877.

No. 1280. *C. W. Vincent*.—Spontaneous Combustion in Factories and Ships.

No. 1285. *A. V. Harcourt*.—The Chemistry of Gas Manufacture. Economic Plants in Jamaica.

Paris. Annales de Chimie et de Physique,—5th Série, Tome 11, Juin 1877.

*C. Bernard*.—Critique expérimentale sur la fonction glycogénésique du foie.

—————. Comptes Rendus,—Tome 84, Nos. 23—26.

No 23. *MM. E. Matthieu et V. Urbain*.—De l'affinité des globules sanguins pour l'acide carbonique. *M. C. M. Goulier*.—Baromètres à siphon dont les indications ne sont pas influencées par les variations de la température. *M. V. Feltz*.—Expériences démontrant qu'il n'y a pas dans le sang putréfié toxique de virus liquides ou solides en dehors des ferments organisés.

No. 24. *M. F. Perrier*.—Etude comparative des observations de jour et de nuit. *M. Gramme*.—Recherche sur l'emploi des machines magnéto-electriques à courants continus. *M. L. Périer*.—Sur les variations du diamètre des globules rouges du sang dans l'espèce humaine au point de vue de l'expertise légale.

No. 25. *P. Secchi*.—Sur l'état actuel de l'atmosphère solaire. *M. Th. du Moncel*.—Sur les électro-aimants à rondelles de fer. *M. Ch. Morel*.—Recherches sur le tétrachlorure de carbone et sur son emploi comme anesthésique.

No. 26. *M. Ch. Richet*.—De la recherche des acides libres du suc gastrique. *M. M. Raynaud*.—Sur la lymphe comme agent de propagation de l'infection vaccinale.

PARIS. Revue des Deux Mondes,—Tome 21, Livraison 4; Tome 22, Livraison 1, 1877.

Tome 21, Liv. 4. *M. E. Burnouf*.—L'âge du bronze et les origines de la métallurgie. *M. E. Planchet*.—L'archipel des Philippines. L'industrie, le commerce, la situation politique.

———. Revue Scientifique,—Nos. 51—53, 1877.

No. 52. *M. C. de Varigny*.—Les Musulmans des Indes, et la question d'orient.

### BOOKS PURCHASED.

BOUCHER, R. Divan de Férâzdak, récits de Mohammed Ben-Habib d'après Ibn-el-Arabi, publié sur le Manuscrit de Sainte-Sophie de Constantinople. Pts. 3—4, 4to., Paris, 1875.

FAIDHERBE, LE GÉNÉRAL. Les Dolmens d'Afrique. Pamphlet, Paris, 1873.

GRIMBLot, M. Extraits du Paritta, textes et commentaires en Pali, avec introduction, traduction, notes et notices par M. Léon Feer. 8vo., Paris 1872.

KHANIkoFF, NICOLAS DE. Mémoire sur l'Ethnographie de la Perse. 4to., Paris, 1866.

MEYNARD, BARBIER DE. Description historique de la ville de Kazvin, extraite du Tarikhè-Guzidèh de Hamd Allah Mustôfi Kazvini. 8vo., Paris, 1858.

———. Extraits de la Chronique Persane d'Herat. Pts. I. II. 8vo., Paris, 1861.

———. La Poésie en Perse. Demy 8vo., 1877.

———. Tableau Littérature du Khorassan et de la Transoxiane au IV<sup>e</sup> Siècle de l'Hégire.

SANGUINETTI, R. B., DR. Satire contre les principales tribus Arabes, extrait du Raïhân al-Albâd. Pamphlet, Paris, 1853.

SENART, M. E. Kaccâyana et la littérature Grammaticale du Pâli. 8vo., Paris, 1871.

WOEPCKE, M. F. Sur l'introduction de l'Arithmétique Indienne en occident et sur deux documents importants publiés par le Prince Don Balhasar Boncompagni et relatifs à ce point de l'histoire des Sciences. 4to., Rome, 1859.





PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR NOVEMBER, 1877.

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The Monthly General Meeting of the Asiatic Society was held on Wednesday, the 7th inst, at 9 o'clock P. M.

W. T. BLANFORD, Esq., F. R. S., Vice President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The receipt of the following presentations were announced—

1. From the author, "Original Texts, on the Origin and History of the People of India, their Religion and Institutions," 2nd Edition, Vols. 1 to 5, by Dr. J. Muir.

2. From Dr. Burmeister a copy of "Description physique de la République Argentine." Tome 2.

3. From Professor P. E. Foucaux, a copy of his translation of "Malavika et Agnimitra, drame Sanskrit de Kalidasa."

4. From Mr. Hyde Clarke, a copy of his pamphlet on "The Khita and Khita-Peruvian Epoch."

5. From Mr. R. N. Cust, a copy of his pamphlet on the "Languages of the Indo-Chinese Peninsula and the Indian Archipelago."

The SECRETARY said that on Mr. Blochmann's recommendation the Council had ordered this pamphlet to be reprinted in the Proceedings.

6. From R. S. Ortori, a copy of a "Report of Progress for the first year of the Oil Surveys of Japan." By B. S. Lyman.

7. From the Rev. J. Long, a number of books and pamphlets.

8. From Mr. S. E. Peal, a copy of his pamphlet entitled, "In regard to the question of the Pre-Aryan Races inhabiting India, the following peculiarity of the river names in Assam, and some of the countries adjoining is worthy of notice.

9. From Messrs. W. E. Ayrton and J. Perry, Japan, copies of the following pamphlets by them:—The Resultant fault in the Conduction, Insulation, and Circuit Tests. On certain Modifications that must be introduced in the fundamental Notions of the Mathematical Theory of Electricity. A Duplex partial Earth Test.

10. From the Trustees of the Indian Museum, a copy of the "Catalogue of the Mollusca in the Indian Museum. Fas. II." By G. Nevill.

11. From Commander Dundas Taylor, Superintendent of Marine Surveys, the following Charts :—Entrance to the Salween River [Maulmain River.] Cape Comorin to Cocanada. Approaches to Point de Galle Harbour.

12. From the Government of India, Home Department, a set of Photographs of the Kuntouggur Temple in Dinájpur, taken by the late Mr. John Ravenshaw, C. S.

13. From Mr. E. T. Atkinson, a number of pamphlets.

The following gentleman, duly proposed and seconded at the last Council Meeting, was balloted for and elected an ordinary Member—

Alexander Grant, Esq., M. I. C. E., proposed by Lieut.-General R. Mackagan, R. E., seconded by Capt. J. Waterhouse.

The following are candidates for ballot at the next Meeting—

1. Dr. Krishna Dhar Ghose, Civil Surgeon of Rangpur, proposed by G. A. Grierson, Esq., C. S., seconded by H. Blochmann, Esq.

2. L. Mandelli, Esq., Darjiling, proposed by W. T. Blanford, Esq., seconded by Capt. J. Waterhouse.

The CHAIRMAN announced to the Meeting that in accordance with Rule 7, the following gentlemen had been balloted for and elected ordinary Members by the Council during the recess—

1. Bábu Pratápanáráyana, Sīñha, Deputy Magistrate, Jehánabád, proposed by Bábu Pratápachandra Ghosha, seconded by H. Blochmann, Esq.

2. Bábu Jnánendrachandra Ghosha, Calcutta, proposed by Bábu Pratápachandra Ghosha, seconded by H. Blochmann, Esq.

3. Bábu Kedaránátha Datta, proposed by Bábu Pratápachandra Ghosha, seconded by H. Blochmann, Esq.

4. Captain H. W. Clarke, R. E., Calcutta, proposed by Captain J. Waterhouse, seconded by H. Blochmann, Esq.

5. John Hart, Esq., Solicitor, High Court, Calcutta, proposed by W. Swinhoe, Esq., seconded by Captain J. Waterhouse.

6. J. Digges la Touch, Esq., C. S., proposed by H. Blochmann, Esq., seconded by Captain J. Waterhouse.

The CHAIRMAN announced that arrangements had been made for publishing an extra volume containing the descriptions by Messrs. Moore and Hewitson of the new species of *Lepidoptera* in the late Mr. Atkinson's collections, as announced at the March meeting. It was proposed that the volume should be in four parts quarto. The first part would be put in hand at once, and the remaining three parts would be completed during the course of the next two years.

The work would be illustrated by coloured plates. Owing to the expense 225 copies only would be printed and would be available to Members by purchase, after presentations had been made to the Societies interested in Natural History exchanging with the Society.

The SECRETARY read the following extract of a letter from Dr. G. E. Dobson on the subject of the busts of Drs. Stoliczka and Oldham.

"On Friday last I met Wood-Mason in London, and we visited Geflowski's studio together. We found both busts completed. That of Oldham is a very striking likeness, and, according to his wish, is undraped. We were both most agreeably surprised to find that the finished bust of Stoliczka is not only as good a likeness as could, under the circumstances, be expected, but is also a very pleasing piece of statuary considered from an artistic point of view, and one that will, in every respect, adorn the rooms of the Asiatic Society. No one should be more capable of judging of the likeness than Wood-Mason who almost lived with Stoliczka, and he is altogether well pleased with Geflowski's work; indeed, he considers the bust is much to be preferred to the painting which, although not a pleasing picture, exhibits an unmistakeable likeness of our ever-lamented friend.

"The bust of Stoliczka represents him attired in a morning coat with cravat tied in a cross bow showing some shirt front. The first model showed a military uniform which I thought in no respect suitable, and I got the other members of the Committee to consent to a change to the dress I have described above which was his usual costume, and which I am sure the Calcutta Committee will approve of also.

"Placing a pair of spectacles on the bust wonderfully increases the likeness.

"I feel sure that you will, on the whole, be pleased with the bust. Much allowance must be made for the difficulties a sculptor has to contend with who has to work from photographs only."

Mr. BLANFORD having vacated the chair, it was taken by Dr. ANDERSON.

The following papers were read—

1. *On a supposed new Sheep from the Central Hills of Kelat.*—By A. O. HUME, C. B.  
(Abstract.)

The skull upon which this species is founded was sent by Major Sandeman from Kelat, and is of about the same size as that of *O. cycloceros*, the 'Gad' or 'Urial,' the horns are longer and more slender, and instead of curving in the same plane as they do in *O. cycloceros* and *O. Vignei*, they curve outwards in the form of a spiral. They thus differ from the horns of *O. cycloceros*, much as, on a larger scale, those of *O. Karelini* do from

those of *O. Hodgsoni*. No skin has hitherto been obtained. It is proposed to name this new sheep *O. Blanfordi*.

The paper will be published, with plate, in Part II of the Journal.

2. *Notes on a collection of Chiroptera from India and Burmah, with descriptions of new species.*—By G. E. DOBSON, M. A., M. B., F. L. S. &c.

(Abstract.)

The collection examined comprised specimens from Sind, collected by Mr. H. E. Watson and Mr. W. T. Blanford, from Travancore, procured by Colonel R. H. Beddome, and from the neighbourhood of Maulmain, obtained by Mr. Limborg. The following species were noticed in each case:

From Sind:—

*Cynopterus marginatus*.

*Scotophilus Temmincki*.

*S. pallidus*.

*Vesperugo abramus*.

*V. Kuhlii*.

*V. (Vesperus) nasutus*, sp. nov.

From Travancore:—

*Phyllorhina speoris*.

*P. fulva*.

*Megaderma lyra*.

*Scotophilus Temmincki*.

From Burmah (neighbourhood of Maulmain.)

*Phyllorhina larvata*.

*Vesperugo (Hesperoptenus) Tickelli*.

*V. (H.) Blanfordi*, sp. nov.

The paper will be published in Part II of the Journal.

3. *Note on two species of Asiatic Bears, the Mamh of Baluchistan and Ursus pruinus, Blyth, of Tibet, and on an apparently undescribed Fox from Baluchistan.*—By W. T. BLANFORD, F. R. S.

(Abstract.)

The specimens described consisted of a bear's skin and two fox-skins from Baluchistan, sent by Major Mockler from Gwádar, and a bear's skin sent by Mr. Mandelli and believed to have come originally from Lhasa.

The bear from Baluchistan is the "Mamh" concerning which there has recently been a discussion in the newspapers. The skin is that of a small brown bear, with small claws, and a pectoral band not extending up the sides of the neck. It appears to be undescribed, and is named *U. Gedrosianus* from the country in which it is found. It is easily distinguished from *U. labiatus*, *U. arctus*, *U. syriacus* and *U. isabellinus* by its

short claws, and by its comparatively short fur, and from *U. torquatus* (*U. tibetanus*, auctorum) by its brown colour. The bear from Tibet appears to have been indicated by Blyth under the name of *U. pruinosus*. It proves not to be, as Blyth supposed, a variety or ally of *U. torquatus*, but to be more nearly affined to *U. isabellinus*, from which it is distinguished by its black legs and larger molars.

The fox from Baluchistan is probably the same as the Bushire species hitherto referred to *Canis famelicus* of Rüppell, a Nubian form. The Baluchistan animal appears distinguished by being much greyer in colour, by wanting the dorsal chesnut stripe, and by its much smaller size, the skull measuring only 3·6 inches in length. It is proposed to name this fox *Vulpes canus*.

The paper will be published in Part II of the Journal.

4. *On an apparently new Hare and some other Mammalia from Gilgit.*—

By W. T. BLANFORD, F. R. S.

(Abstract.)

This paper contains notes on the following animals collected by Captain Biddulph in Gilgit and the neighbourhood.

1. *Vulpes montanus*, a peculiar variety in summer dress.
2. *Lutra* sp.
3. *Mus* sp. allied to *M. Bactrianus* but probably new.
4. *Lepus Biddulphi*, sp. nov. allied to *L. Tibetanus*, *L. Pamirensis*, &c., but apparently distinct from all. It is distinguished from *L. Tibetanus* by its longer fur, by having the rump of the same colour as the back, and by several differences in the skull, such as having the nasal bones abruptly truncated and not rounded at their posterior extremity, and both the cranium and lower jaw much lower in proportion to the length. From *L. Pamirensis* the new species is distinguished by the fur being less dense, by the hair on the anterior portion of the ears not being harsh, by wanting the grey rump, &c.

5. *Lagomys auritus*, var. The paper will be published in part II of the Journal.

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The Council have much pleasure in reprinting from the Transactions of the Philological Society, with the permission of the author, the following pamphlet in continuation of a similar paper on Eastern Indian Languages printed in the Proceedings for January last.

*On the Languages of the Indo-Chinese Peninsula, and the Indian Archipelago.*—By R. N. CUST, Esq.

“In our report of last year on the subject of the Non-Aryan Languages of India,\* we ended abruptly on the confines of the Political Govern-

\* *Vide* Proceedings, A. S. B. January 1877.

ment of Bengal. It was necessary, for want of space, to draw the line somewhere; but there was no ethnical or linguistic reason for pausing there, and we now take up the thread of our narrative, and enter into British Burmah, and thence proceeding southward into the Indo-Chinese Peninsula, notice the islands of the Indian, as distinguished from the Austral Archipelago, and throw our net over the whole country which intervenes betwixt India and China, the debatable land of the Brahminical and Buddhist religions.

"To avoid the charge of unnecessarily repeating the statements of others, it may be stated that this region has never been treated as a whole since Leyden's paper on the Indo-Chinese Languages in the Asiatic Researches of 1808, a masterly production for the time; and yet some of these languages have been known in Europe by published treatises for more than two hundred years. Max Müller, in his Lectures on the Science of Language, avoids the subject, and refers his readers to his Letter to Bunsen, an Appendix to the Philosophy of History, wonderful for the period, but a book not readily accessible, and now twenty-five years behind date. Whitney, in his Life and Growth of Languages, disposes very summarily, and in the lump, of this great family. Hovelacque, in his Linguistique, dated 1876, fails, where a French book ought to have been strong, for he fairly shirks the Cambojan, and treats the Annamite most inadequately. He is not strictly correct with regard to Siamese and Burmese. He ignores altogether the Mon, Shan, and Savage Languages, and has no notice of Kawi. Both Hovelacque and Whitney had access to Friederich Müller's Linguistic Essay in the Voyage of the Novara, and quote from it freely. The valuable books of Crawford, Raffles, and Marsden, the learned essays of Logan, Bigandet, Lowe, Bastian, and others, are known to few; even the great epoch-making essay of Humboldt on the Kawi language has never appeared in an English dress. As to the French writers on the Cambojan and Annamite, the Dutch writers on Malay, Javanese, Kawi, Bugi, Macassar, and the numerous inferior languages of the Malay Archipelago, the Spanish writers on Tagál, Bisayan, and the minor languages of the Philippines, their very name is unknown. Mr. Latham's chapters, in his Elements of Comparative Philology, on these languages, fall short of the fullness and accuracy which distinguish the rest of his work, and are twenty years behind date. The newly-published anonymous Dictionary of Languages, though very brief, is for the most part correct.

"Crossing the political boundary of British Burmah, we find ourselves in the Province of Arracan, the people of which are called Mugs, (derived from Maghada, according to Leyden,) are partly Buddhist, partly Brahminical in religion, and speak a dialect of the Burmese, from whom they are separated by the great wall of the Yoma range of mountains. The name

Rakheng is applied to the language of the inhabitants of Arracan, from the Pali word meaning 'abode of demons.' The hill tribes are pagan and savages, and, with the exception of the Khyeng, we have little knowledge of their language. They are the same as those alluded to by name in our last year's paper as on the frontier of Chittagong, the Mrúng, Kumi, and Mru. Latham calls them the tribes of the River Koladyn or Kaladan, the limit of Kalas, the term by which they call all foreigners, quoting from a notice of them under that name by Latter in the Journal of the Bengal Asiatic Society. Their numbers, features, and relative relation to each other, and to Burmese, has still to be determined; they have no written character, and will probably in the progress of civilization disappear. A vocabulary of these dialects is given in an appendix to Captain Lewin's Hill Tracts of Chittagong, 1869. Sir A. Phayre and Mr. Bryan Hodgson describe them in J. A. S. B.

"Of one language, the Khyeng or Hiou, spoken by a people who are pagans, but the most extensively diffused in the great Western Mountain range of Burmah, and who are settling down to regular agriculture, we have a satisfactory grammatical memorandum by a Member of our Society, Major G. E. Fryer, who occupies the post of Deputy Commissioner of the District of Sandoway, in which they are included. This language may be classed as in the first stage of agglutination; the tones are very elaborate, but the construction simple. Attached to these notes is a vocabulary: there is no written character, no literature, and, with the exception of notices and vocabularies in the Asiatic Researches and in the J. A. S. B., in which also Major Fryer's note appeared, we have no further information.

"Passing down the coast we come to the delta of the great river of Burmah, the Irawadi. This has, from prehistoric times, been occupied by a race separate in language from the Burmese; the race is known as Talain, the language as Peguan or Mon, and the province as Pegu. They had their day of greatness, but within the last century were overpowered by the Burmese, who occupy the middle regions of the Irawadi, and during their time of power tried to exterminate this language, which has, however, revived, since, in 1853, Pegu became a British Province, and Rangoon the capital of British Burmah.

"Dr. Mason and Sir A. Phayre have stated their opinion in favour of a connexion linguistically between the Mon and the language of the Hos or Koles, on the other side of the Bay of Bengal, in the Western District of Bengal. This is one of the hard questions of Philology and Ethnology. We have an excellent grammar of the language, by the late Rev. Mr. Haswell, a Protestant Missionary, who does not agree in this theory. Moreover, a connexion is asserted linguistically, by the late Dr. Logan, between the Mon and the Annamite language, on the confines of China,



which we shall notice further down. Sir A. Phayre states that it is uncertain, when these first immigrant Mons arrived; they were joined by a Dravidian emigration from the Indian Peninsula, and the word Talain survives as a record of the Telinga connexion.

"The Mon alphabet is of an Indian source through the Dravidian, but there is little trace in the language of that connexion. Dr. Bastian (in the *Journal of the Royal Asiatic Society*) says that the Mons adopted for their sole alphabet (religious and secular) the Pali alphabet, which is used everywhere else for the sacred books only. There is no dictionary of the language, but a vocabulary is attached to the grammar, and there are vocabularies by Crawford, Buchanan, Sir G. Campbell, and Hunter. The people are Buddhists. Their sacred books are translated into Mon, abundantly interspersed with Pali, an inflective Aryan language. There are many loan Pali and Burmese words brought in by religious and secular domination. It is classed as monosyllabic, but it is impossible, in the space allotted in this Report, to define with precision the transition stages of Monosyllabic and Agglutinating languages. There are no changes in nouns to mark their relations to other words; this is shown only by position. Numbers and genders are indicated by addition of words: tenses and moods are inadequately shown by affixes and prefixes; frequently there is nothing but the connexion to show them. The construction of the language is quite different from the Burmese, the location of words being almost always the reverse. This is one of the languages, whose days are numbered; it may, survive in villages, or among the emigrants settled in Siam, but Burmese will supplant it in the towns. We have a translation of the New Testament in this language.

"Following the coast to the limits of British Burmah, we enter the province of Tenasserim. A portion is occupied by the same race of Peguans and the remainder by congeners of the Burmese race, speaking a dialect of that language under the name of Tavoyi or Taneagsari. A list of the words of a dialect in Tenasserim called Tungtho or Thountú, is given by Messrs. B. Hodgson and Hunter, as collected by Dr. Morton, which, according to Mason, is nearly allied to Pwo Karén, and according to Bastian, had an alphabet of its own. The most southern portion of this long narrow province is only separated by a low range of hills from the kingdom of Siam; but in the mountainous tract in the corner of junction of Siam and Burmah is the country of the Karéns, who have obtained a notoriety from their ready acceptance of some form of the Christian religion at the hands of energetic missionaries, Judson, Mason, and Wade, to whom we are indebted for ample linguistic information. They are three distinct tribes: the Sgan and the Pwo, and the Karenni or Kaya, or Red Karén. They were downright savages, and pagans, and many are so still. The Red

Karén are purposely left independent both of the British and Burmese Governments: their dialects differ so much as to render communication as difficult as if they were separate languages. Sir A. Phayre reports within the limits of British Burmah the following subdivisions: Pakee, Maune Pagha, Bghae, Wee-Waee, and Sgae.

"It is asserted that the Kakhyens, who will be noted hereafter, and Karéns, are identical: the legends of the Karéns certainly point to a descent from the mountains. Out of fifty thousand nearly one-half are Christians. They have no literature, and no indigenous character: the Roman and Burmese are both employed. The field has been well worked. We have grammars by Wade and Mason, in two dialects; dictionaries by Wade and Mason; vocabularies by Hunter, Bennett, Wade, and Mason. Portions of the Bible have been translated into three dialects, and numerous contributions made to journals, and many separate volumes published in Europe and America.

"Ascending the Irawadi, we find its middle course occupied by the Burmahs, or Burmese, speaking the great Burmese language, called in early days the Avan, a language great in religion, politics, and literature, the chief language of the eastern portion of the Tibeto-Burman group, as the Tibetan is of the northern. The word Burmah is a corruption of Myamma, or Mārumma, which is again a contraction of the Sanskrit Mahavarna, the honorary title of the Khshatrya. The Burmese are a nation of boundless pride and great pretension, but they point to the Rakheng, or Arrakanese, as the oldest dialect of their language. The Burmese and Tibetan are the only literary languages in the midst of a series of unlettered and savage congeners, but a closer scrutiny will, before long, point out the distinguishing features, and enable a proper classification to be made of sub-families, while admitting a common origin. In addition to those already named, and the Kakhyens, to be noticed in next paragraph, there are numerous kindred languages of the Tibeto-Burman family within the government of Bengal and Assam, and noticed in the report of last year. There were seven races of the Myamma stock, Rakheng, Burmese, Talain, Khyen, Karén, Yo, and Tavoyi. The Burmese have their own character, derived from the Indian. The Pali is their sacred language as Buddhists. Leyden, as far back as 1808, remarked that the Burmese was not purely monosyllabic, but a connecting link between monosyllabic and polysyllabic languages; this opinion has been justified by a more intimate acquaintance. By many authorities Burmese and Karén are classed as monosyllabic. Max Müller thinks that they are *not* so; but, as before stated, before any decision is arrived at, we must settle what the line of demarcation is. If the occasional use of particles, which have no meaning by themselves, removes them from the monosyllabic order, then Chinese itself, with its

dead words, must cease to be styled monosyllabic. Mere juxtaposition, moreover, is not agglutination, and further, admitting that Chinese has rudimentary traces of agglutination, it is the extent, to which this principle appears to be the rule, rather than the exception, of each language, that must decide the order to which the language belongs. All the Indo-Chinese languages admit and incorporate words from the Pali, an inflexional language, and the degree to which they break up these loan-words, and alter them, is a test of the genius of the language in assimilating discordant materials. It has been known by published works in Europe for more than a century. There are dictionaries by Hough, Judson, and Lane; grammars by Judson, Latter, and Carey; vocabularies by Leyden, Buchanan, Latham, Sir G. Campbell, and Hunter; miscellaneous treatises by Mainwaring, Chase, Towers, Phayre, and Low; and a famous treatise by Schleiermacher, on the influence of writing upon a language. This is a strong vernacular, likely to complete the absorption already commenced of all its weaker neighbours, and worthy to do so. The whole Bible is translated into Burmese.

"Ascending the river Irawadi, we find in the mountains separating Burmah from China an unruly race called Kakhyen or Kaku, known in the valley of Assam as Singpho (which merely means 'a man') or Chingpaw, Highlanders, pagans, and savages at a decidedly low state of civilization, though living in villages, and agriculturists. In Dr. Anderson's 'Expedition to Western Yunan,' published in 1871, and his 'Mandalay to Momien,' published in 1876, we read of his long detention among these inhospitable tribes in 1868 and 1875, during two unsuccessful attempts to pass from Bhamo into Yunan. He recognized the physical resemblance betwixt them and the Karéns, which is confirmed by their language. He gives a vocabulary of the Kakhyens, which he (perhaps incorrectly) describes as monosyllabic, spoken in an ascending tone, every sentence ending in a long clear 'ee.' The Roman Catholic Bishop Bigandet, who visited this tract, identified them with the Singphos described in our report of last year, and other tribes in the Assam valley, and noticed their resemblance to the Khyens and Karéns. The pronunciation is soft and easy: the construction of sentences simple and direct; there is no written character. Few Kakhyens, except the chiefs, could speak Burmese, but some could speak and write Chinese.

"Dr. Anderson found another tribe, blended in daily life with the Kakhyens, the Leesaws, who were perfectly distinct in every respect, and whose language was akin to the Burmese.

"Here we come upon the gates of China, and the channel of a future traffic, consecrated by the blood of Margary. We shall know more soon of the Kakhyens. We have vocabularies of them and the Leesaws, by Anderson; of the Kakhyens by Bigandet, Robinson, and Logan.

“Dr. Logan, who had rare opportunities of studying the subject, which he has illustrated by a series of learned papers in the *Journal of the Indian Archipelago* (which died with him in 1859), would divide the languages of the Indo-Chinese into two main branches: 1, the Western Himalayan, or Tibetan, which includes the Burman, Kakhien, Karén, and their numerous uncultivated congeners in the valley of the Irawadi and Burumpootur; and the Eastern Himalayan, or Mon-Annam, including the Mon, Shan, Cambojan, and Annamite families, and all their rude congeners. It is at this point that we leave the Western Himalayan branch, and enter the Eastern region. We also leave the regions of the direct and indirect influence of British India, the great valleys of the Irawadi, Salwyn, and Sitang, which flow into the Bay of Bengal, and cross a physical and linguistic watershed into a country independent of British power, and speaking a more strictly monosyllabic language. Buddhism and the great Hindu civilization still accompany us, and at one point, indeed, the Shan civilization crosses the watershed and, leaving the valleys of the rivers Mekong and Menam, penetrates to the valleys of the Irawadi and the Burumpootur. The Shan states, which come first under notice, are divided into three groups, which are respectively subject to Burmah, Siam, and China. A fourth group, which is part of British India, known as the tribes of Khamti, Ahom, and Aitom, were included in our report of last year. In a narrow wedge of inconsiderable width, yet no less than fifteen degrees in length, the Shan language extends from the Burumpootur in Assam, a province of British India, to Bangkok on the Gulf of Siam. Max Müller declares that they cling by their roots to the same soil as the Tibeto-Burman family, which we have just described. They are known as Tai, are Buddhists, though clinging to old pagan worships of Nats and spirits; civilized, as an instance of which all the branches of the family have their own special alphabet, all no doubt of the same stock, but all with special variations. Thus we have one alphabet of the great Siamese conquering people, two varieties of the subject Laotians, a third of the Shans dependent on Burmah, both the latter affected by the Burmese alphabet, and circular in shape. The letters of the alphabet of the Tal Mow, or Tai Khe, within the Chinese province of Yunan, are diamond-shaped, a fact to be attributed to Chinese influence. The alphabets of the Khamti and Ahom, within the limits of British India, resemble the Shan, but with certain modifications. The language of this Tai family was, no doubt, originally the same, and is still essentially the same. They were a conquering race, who came from the north in historic times, and still hold their own, at the expense of their neighbours, with great power and vitality; their language, in process of time, became separated into dialects; there are laws of euphony, and variations of vocabulary, peculiar to each dialect. In the Shan

states the Burmese domination has left its mark. Many Pali words have crept in from religious influences. All the Tai languages are tonal, and accuracy in speaking depends on the exact knowledge of the tone; the Siamese alphabet expresses these tones, but the others do not. Books are generally metrical; the language is rich to redundancy in synonyms.

"In our last year's report we noticed the vocabularies of Khamti and Ahom in the valley of Assam. The Shan states of Burmah are represented by a Shan grammar, published by the Rev. J. Cushing, at Rangoon, in 1871, and a vocabulary is in the course of preparation. There are vocabularies by Hunter and others. It is distinctly asserted that, while the Siamese alone call themselves Thai or 'free,' all the others call themselves Tai without the aspirate, and for some unexplained reason; and, again, that the language is monosyllabic, and that the many polysyllabic words in it are loan-words from the Aryan Pali and the agglutinating Burmese; the religious language of the Shans is a mosaic of Shan, Pali, and Burmese.

"While of the Burmese Shan states we have full information, of the Chinese Shan, or Tai Mow, or Tai Khé, we have scant knowledge. Mr. Margary was killed in a Shan town, and the French expedition under Captain Lagrée passed through several of them. We have vocabularies of the Shan and Hota Shan in Yunan by Anderson, of the Shan by Bishop Bigandet and Yule; and vocabularies of the Pa-laong or Palo, a sub-family of the Shans, by Bigandet, Logan, Latham, Anderson, and Yule. The establishment of a British Agent at Bhamo will throw light upon these dark places.

"The term 'Lawa' is said to be applied by the Chinese to all frontier tribes. The Shan states within the boundaries of the kingdom of Siam are called 'Laos.' They are Buddhists, with pagan customs, and fairly civilized, and their language has acquired in linguistic books the name of Laotian. Nothing was known of them until M. Mouhot visited them in 1861, and died on the frontier. He had followed the course of the Menam, and struck across to the Mekong. In 1861 the French expedition under Captain Lagrée and Lieutenant Garnier, ascended the Mekong as far as the neighbourhood of Talifue in Yunan, and threw a flood of light on the country. The language is pronounced identical with Siamese, with peculiarities. Outside the civilized Laos, in a much lower stage of civilization, are downright pagan Lawas, and we find ancient inhabitants of the country still retaining their independence under the generic name of Moi, but the special name of Khasmi, Khmens, Lewett, and Doe; vocabularies are supplied by Hunter, Garnier, and Mouhot.

"Leaving the river Mekong, which strikes to the east, we follow the course of the river Menam to Bangkok, the capital of the great kingdom of Siam, who call themselves 'Thai,' but were called by the Malays 'Siam.'

The Siamese language is spoken by four millions, ridiculously proud, and a conquering race, maintaining till within our time a conflict with the Burmese to the north, the Malays to the south, and the Annamites and Cambojans to the west. Bastian remarks, in the pages of the *J. R. A. S.*, that the Siamese gradually diverged from pure monosyllabism, by the introduction of words from the Pali, and thus it differed very considerably from the Chinese; on the other hand, it is much more monosyllabic, and more powerfully accented, than the Burmese. Next to the Chinese, according to Bastian, it is richest in tones of the so-called monosyllabic languages. This language has been known to Europeans for two centuries. An inscription exists in the ruins of the old capital of Ayuthia, dated 1284 A. D. There are three idioms, that of the sacred Buddhistic books, that of the higher orders, and that of the people. In proportion to the elevation of the ideas is the introduction of Sanskrit and Pali words, accommodated to Siamese vocalization. There is an enormous religious and secular literature, in which there is a study of euphony and neglect of sense, and it is deemed an elegance to have many words in the same sentence commencing with the same letter. European printing presses are established at Bangkok, and Government Gazettes are published, but no indigenous native printing press. The King himself talks and writes good English, as did his predecessor. The best grammar and dictionary are by Bishop Pallegoix. The vocabulary of Loubere is dated 1687 A. D., and it is unnecessary to notice later vocabularies and fugitive notices of so great a language, for they are numerous, some scientific, like those by W. Schott, De Rosny, and Gützlaff; others of mere conversational utility. The New Testament has been translated into Siamese.

“Adjacent to the prosperous realm, and the well-known language of the Siamese, is the fallen and sadly-reduced kingdom, and the scarcely recognized idiom of the Cambojan, on the great river of Cambodia, the river Mekong. All the surrounding nations admit, that the Cambojans were their teachers in religion and science; but for the interference of the French, who have now taken the remnant of the kingdom under their protection, in all probability it would have been totally absorbed in its two powerful neighbours, Annam and Siam. It is calculated that about one million and a half still speak the modern type of the ancient language of the Khmer or Khomer, though the kingdom of Cambodia comprises only one million; the remainder are subjects either of Siam or of French Cochin-China. The magnificent ruins of Angkor, or Nakhon Wat, have drawn attention to the subject, and among these ruins are inscriptions, in an archaic form of the special character of the Cambojan, the most easterly derivative of the great Indian prototype alphabet, and in an archaic form of language imperfectly understood, if at all, by the modern Buddhist

priesthood ; at least, these inscriptions have not been satisfactorily translated.

" We walk on uncertain ground here. The great Khmer people differed essentially from their neighbours of Annam and Siam ; they are an elder race, having descended the river Mekong at a period anterior to the Thai, and before the powerful race of Annam crossed the dividing range. The present Cambojans are Buddhists, with marked pagan customs. Their language is placed by Dr. Logan in his Mon-Annam class, but it differs materially from any other monosyllabic language. It has no tones, being spoken *recto tono* ; the numeration is quinary. Lieut. Garnier remarks that modern Cambojan is a transition language betwixt the polysyllabic language of the Malay, and the monosyllabic language of Indo-Chinese. It is full of Siamese words, and Dr. Bastian remarks, that it is so full of loan-words, that for a long time it was mistaken for Siamese. Many loan-words are found contracted in the manner required by the tendency of the Cambojan language, which is certainly towards monosyllabism. It has also loan-words from Malay, Pali, Annamite, and Mon. The inscriptions have been photographed : the written annals go back to A. D. 1346, but there is evidence of a much higher antiquity to the power and civilization of the nation. We find mention of a Manuel Pratique of the Cambojan, by the late M. Janneau, who held a civil appointment in Cambodia, but so few copies were struck off, that it is not accessible. We have vocabularies by Garnier, Mouhot, Crawford, Aymonier, and a dictionary of French and Cambojan, and numerous treatises by the latter. We have an essay on the language by Mr. H. G. Kennedy, and clearly may expect that our knowledge of this important language, so accessible, and so abundant in archaic monuments, and spoken to this day by a civilized people, should be speedily brought up to a proper level.

" It is stated that, in addition to the Cambojan and Laotian, above described, there are at least a score of idioms spoken on the banks of the great river Mekong, and its numerous confluent, and in the mountain chain extending from Tonquin to French Cochin-China. According to the custom of these polyglott regions, every town has at least four names, being known under a different combination of syllables by the Siamese, Annamites, Cambojans, and Savage people. Thus these wild Savage pagan races are themselves called Penoms by the Cambojans, Khu by the Siamese, Moi by the Annamese ; all these words mean ' savage,' and we have seen above that the Chinese use ' Lawa' in much the same sense. Lieut. Garnier remarks on the important affinity of the Cambojan with the idiom of some of these Savage races. We are in an absolutely *incognita terra*, and require a master mind, like that of Mr. Bryan Hodgson, to collect materials during a patient note-taking of twenty-five years, and a fine discernment

like that of Max Müller to arrange them. They have no written character, no literature, and we need not add that there are no grammatical sketches, and but very scant vocabularies. Among some, like the Styens, there is a Roman Catholic Mission, maintained by devoted Frenchmen, who are prepared to live and die at their posts, an example to missionaries of another Nation and Persuasion. Garnier supplies vocabularies of some of these races. The southern division consists of Samre, Xong, Stieng, Banar, Cedang, Huei, Catson, Sirie Hin, Proons. The northern division consists of So, Nanhang Mi, Khmons, Lewett, Moutse, Khos, Kongs, Lolos, Kato, Honhi, Ykia, Minkia, Mautse, Miaotse. Crawford gives vocabularies of a tribe called Ka Chong, and remarks that Ka means a slave, and of others, whose names appear in Garnier's list. M. Mouhot also gives vocabularies of some of the idioms. There is a lamentable want of material, but the linguistic value of these simple uncultivated idioms on the fringe of the great Empire of China may prove of the greatest importance.

"Descending the river Mekong to the sea, we find ourselves in French Cochinchina, and the nucleus of a new civilization. Whether this settlement will pay commercially is a question; at any rate, linguistically, it is a great step in advance, and we find sweetness and light thrown round the hard questions of grammar. The French have more than a century meddled in the affairs of Cochinchina, and such meddling generally ends in annexation. The kingdom of Annam consists of two provinces, Tonquin and Cochinchina, and occupies the whole length of the eastern face of the Indo-Chinese Peninsula, extending from 8° to 23°. The central portion comprises the old Malay kingdom of Champa, of which the language, religion, and nationality have perished. Colonel Yule, in the *Geographical Magazine*, March, 1877, gives the history of this forgotten State, and Crawford, in his *Malay Grammar*, analyzes the vocables, and considers that it was fundamentally a local language, mixed up with much Malayan. Of the three capitals, Huet, Hanoy, and Saigon, the latter has passed by conquest into the hands of the French. The people are Buddhists, but of the Chinese type; their language is a congener of Chinese, but the lower classes use many words of uncertain origin, because they have been altered to suit the euphonic laws of a monosyllabic language, in which the use of tones presents a great difficulty to the student. Dissyllables do exist, but are rare, and therefore there is a necessity for tones to distinguish the meaning of homophones. There are abundance of particles, which have no independent existence as words, and yet they do not coalesce, so as to form one word with the word which they are employed to qualify. The sounds are easy enough to acquire, and the Roman Catholic Missionaries, who have lived and died for more than a century in the kingdom, have by ingenious additions adapted the Latin alphabet to these sounds, which makes the



study of the language to a certain extent easy, and independent of the acquisition of the native alphabet, which is composed of a selection of Chinese characters, used phonetically as a syllabary, with upwards of nine hundred varieties. So clumsy is this arrangement, that the highest literati set it aside, and use the Chinese ideographic signs, thus entailing upon themselves the labour of learning that character. In such a language the meaning has to be gathered from the position of the words and the context. The idea of past, present, and future is expressed by particles, or omitted; three-fourths of the names are formed by addition of particles to the verb; there is no passive voice; all animate objects have one determinate prefix, and inanimate another, and as an instance of the redundancy of vocables, it may be stated that there are nine different words for 'carrying,' with reference to the hand, head, etc. The word 'Army' is a portion of seventy-five compounds, and the word 'to do,' implying a sense of action, appears in one hundred and thirty-five compounds. There is an abundant literature. The nation is civilized in the Chinese type, thriving, and until the French occupation, was warlike, and ambitious. Within the memory of man the sovereigns were too proud to give a personal audience to the ambassadors of the rulers of India. The dialect of the three provinces varies to a certain extent. The famous dictionary of De Rhodes was published at Rome in 1654 A. D. with a short grammar. The standard dictionary is that of Tabred and Pigneaux in Latin. Aubaret has published a satisfactory grammar and vocabulary at Paris, 1867, for the special use of students and the French officials. The language is included in the course of the *Ecole des Langues Orientales* at Paris; and the Professor Aymonier has written treatises on Cochinchinese, as has also M. De Gramont. W. Schott has written on the language and character, so have Dr. Bastian and M. de Rosny. We may pass over numerous vocabularies of different dates and degrees of excellence. Des Michels has published at Paris, in 1869, dialogues and text-books. Our knowledge of this language is ample, but of its rude congeners, and its past history, and its actual linguistic relation to the Mon on one side, and Chinese on the other, we have still to look for information based upon scientific procedure. With this language we have completed the survey of the Indo-Chinese Peninsula, with the exception of the Malay Peninsula, which must, linguistically, be treated as an island of the Indian Archipelago.

"And before we enter on this new world we must sweep up five clusters of islands in the Indian Ocean and Bay of Bengal, so as to complete this great subject, viz., the Andamans, the Nicobars, the Maldives, the Laccadives, and the Mergui Archipelago, all of which are included within the limits of British India.

"The Andamans contain the famous convict settlement, which in 1872

cost the life of the Viceroy of India. They are densely covered with jungle which contains nothing but wild pigs and wild berries. The Andamanese, or Mincopies, are a dwarfed, woolly-haired, dark-skinned, Negrito race, pagans, in a state of absence of civilization below the practice of agriculture. They are divided into tribes, and have several languages very different, but having a few words in common, without written characters. They are as low in civilization as any tribe on earth, though on the pathway of the world's civilization for centuries; they have no numerals. We have scanty vocabularies by De Roepstorff, an official of the Indian Government, 1875; and Professor Owen, in his discourse at the Oriental Congress of London, 1874, hazards the opinion of their poor unsettled language showing more relationship to the Mon than to the Burmese.

"The neighbouring Nicobars are peopled in the interior by an equally degraded race, the Shobœngs, but the majority of the inhabitants are of a very superior order, of uncertain origin, and with no admitted relationship to Malays or Burmese. They are brown, pagans, and civilized to a certain extent. Owing to intercourse with foreign ships, they speak several foreign languages. Mr. de Roepstorff, who is the officer in charge of these islands, supplied in 1875 a vocabulary of great extent of the dialects of four of the islands—Nankowry, Great Nicobar, Theressa, and Car Nicobar, as well as a limited list of words used by the shy and savage Shobœngs. They have no written character, and no education. Vocabularies are also given by Colebrooke, Man, and Fonteaux in the pages of the *J. A. S. B.* In the new edition of the *Encyclopædia Britannica* there is an exhaustive article by Colonel Yule. We may fairly hope that the linguistic question as regards these two groups will be satisfactorily answered in the next quarter of a century.

"Along the Tenasserim coast, at its southern extremity, is a small archipelago of islands opposite to Mergui: in some of these reside a peaceful people, who are pagans, of uncertain race, in low civilization; they are called Silang, and we have a vocabulary by Logan in the pages of the *Journal of the Indian Archipelago*.

"On the other side of the Peninsula of India we come upon the two groups of Atolls, the Maldives, and Laccadives. The former are said to contain a population of twenty thousand; they have reached a limited degree of civilization, and were made Muhammadans by the Arabs, with a certain amount of severity, the memory of which lives to this day. Their modern written character is derived principally from the so-called Arabic, but really Indian, numerals, written from right to left. The Royal Asiatic Society possess several manuscripts. With regard to the *ancient* character there is obscurity. Lieut. Christopher, who, in the pages of the *Journal Royal Asiatic Society*, describes the language and character, and supplies a

vocabulary, gives specimens of eighteen ancient characters, but M. Abbadie, the Abyssinian scholar, mentions in the *Journal of the Indian Archipelago*, that this ancient character was a syllabary, and not an alphabet, and that only a portion of the characters, once possessed by Lieut. Christopher, have been made known to us. The language is akin to Sinhalese, and therefore of Aryan origin. The native Sultan is a dependent of the Government of Ceylon.

“The Laccadives lie more to the north, and are under the government of Madras, and we have accounts of visits paid to them by the officials of Government, in the *Journal of the Madras and Bombay Asiatic Society*. The language is identical with that of the Maldives.

“We now pass into the Indian Archipelago, and, with the exception of the narrow peninsula of Malacca, leave the continent of Asia, and find ourselves in a new terminology of Polynesia, Indonesia, and Malaisia, besides numerous other compounds of the word for Island (identical in Greek and Javanese), applicable to the region of Oceania beyond the limits of this report. In some linguistic books the whole family of languages as far as Easter Island is called the Polynesian, including the Malayan as a sub-family; there is, therefore, a wider and narrower use of the term. Indian culture, Indian religion, Indian written characters, and Indian names accompany us: but the Race and the Vernacular have wholly changed. As we have no actual physical boundary to this portion of our inquiry, such as was supplied by the coast-line of the Indo-Chinese Peninsula, we must proceed to draw a line on the outer edge of the Shallow-Sea region, so as to include all the islands on that submarine plateau, whose Fauna is absolutely, and whose Flora and Ethnic and Linguistic features to a great degree are distinct from the Deep-Sea region or Papuanesia. It exceeds the line at some points, so as to include particular islands, such as Lombok, Celebes, the Moluccas, Sumbawa, Flores, and Timour. Two strongly contrasted races occupy these islands, which, if lumped together, would form a large continent: first the Malays, a brown race with lank hair; secondly the Negritos, with black skins and curly hair. Between these are intermediate tribes, the exact position of which it is hard to determine. Mr. Wallace, in his survey of the whole Malay Archipelago, gives specimens of fifty-nine languages, but he omits some, which did not come within his scope: here lies the work of the philologists of the next generation, who are advised to leave the well-worn tracks of the Indo-European family, and bring order out of the existing confusion in the dialects of this Archipelago. Geographically and linguistically this region is part of Asia, while the portion, which we reject, is for the same reasons part of Australasia.

“The race spread and dominant over this region has been called the Malayan, but there are Malays proper, and tribes with only a Malay element

in their language. The word 'Malay' has a wider sense ethnologically than linguistically. For convenience sake the race is called Malayan, and the language is called Malay. The Malay proper also, though possessing considerable uniformity of physical and mental characteristics, differs in civilization and language.

"There are four great tribes, a few minor semi-civilized tribes, and a number of others who are downright savages.

"I. The Malays proper, inhabiting the Malay peninsula, and almost all the coast of Borneo and Sumatra, who all speak Malay, or dialects of it, are Muhammadans, and use an Arabic character.

"II. The Javanese, who inhabit Java, part of Sumatra, Madura, of Bali, and part of Lombok. They speak the kindred tongues of Javanese, Madurese, Balinese, Sundanese, with a special character of Indian origin. They are Muhammadans, with the exception of the inhabitants of Bali and a portion of those of Lombok, who are the sole survivors of the great Hindu civilization, and are Brahmanists or Buddhists.

"III. The Bugis or Wugis, who inhabit the greater part of the Celebes, and have a settlement in the Malacca peninsula and in the island of Sumbawa. They speak the Bugi, Macassar, and other languages, and have two characters of Indian origin, and are Muhammadans.

"IV. The Tagáls, who inhabit the Philippine Islands, and are chiefly Roman Catholic Christians: the remainder are Muhammadans. They speak the Tagál, Bisayan, and other languages, and use a special character.

"The inhabitants of the Molucca Islands, the best known of which are Banda, Tidore, Ternate, and Amboyna, are semi-civilized Muhammadans, speak a variety of languages, unintelligible to Malays, compounded of Bugi and Javanese, mixed up with the indigenous language, and have no written character.

"The less-civilized Malays are the Dhyaks of Borneo, the Battas, with three dialects, the Lampungs, and Rejangs of Sumatra, the Jakuns, and other Orung Binwuh (people of the country) of Malacca. All these are pagans, the Battas cannibals, and some at the lowest ebb of civilization. Over and above are the black woolly-haired races, one of which is found in Malacca under the name of the Samang, and another of the name of Mantra, described in the *Revue de Philologie*, vol. i. Negritos are found also in some other islands, though totally absent from Java, Sumatra, Borneo and Celebes. They have survived in a state of paganism and barbarism. Another race, called by the Portuguese Alfuros (from *al fuori*, the outsiders), are found in the Celebes, Philippines, and the Moluccas, but are quite distinct both from the brown Malay and black Negrito.

"This then is our subject. About fifty identified languages come within our scope. Nine great languages or groups of languages worthy of

separate notice : 1. The Malay proper. 2. The Javanese in its modern form, and the archaic Kawi, with its three sister-languages, the Balinese, Sundanese, and Madurese. 3. The Sassak of Lombok. 4, 5. The Macassar and Bugi of Celebes. 6, 7. The Tagál and Bisayan of the Philippines. 8. The Dhyak of Borneo. 9. The Batta, with its three dialects ; the Lampung and Rejang, all in Sumatra. Crawfurd thinks that they may morphologically be divided into three great classes : 1. From Sumatra to Borneo and Lompok eastward. 2. From Celebes to the Moluccas inclusive. 3. The Philippine Archipelago. There is considerable difference in structure, but still more in phonetism. These languages have among them eleven indigenous alphabets, four, *viz.* the archaic Bugi, the Bima, the Kawi, and old Sundanese, obsolete, and seven in daily use, the Javanese, Bugi, Batta, Rejang, Lampong, Korinchi, and Tagál. All of these alphabets, though their use is immemorial, are phonetic, and like the Indian, are so far syllabaries, that they include an *a* in their sound. All of them (except Kawi) Crawfurd maintains to be of native origin, and not to belong to any alphabetical family ; he admits that some of them may have borrowed their arrangement and some modification from Indian sources. Subsequent study of the subject of Alphabets in general has led to the affiliation through the Phœnician of every known alphabet (in the strict sense) to the Egyptian hieroglyphics being looked upon as a scientific fact. The remaining languages are represented by vocabularies, but have no literature, and will probably give way to their stronger rivals. It would be a waste of time and type to set out their names, for nothing is really known worth recording ; but they stand out as a warning with many others of the futility of attempts to affiliate all languages to one, or to bring back languages to a limited number of seed plots, until the data for such theories are in a much more advanced state of preparation.

“ We must here notice briefly a very great controversy, of first-rate importance both from its subject matter, and the fame of the scholars who have taken part in it. William von Humboldt in his posthumous work, ‘ Ueber die Kawi Sprache,’ arrived at the conclusion, ‘ that Malay was the stem, from which the various languages spoken by the brown races inhabiting the archipelago had branched out ; that all the brown races belonged to one family, the Malay ; that a convulsion of nature had broken up a continent, and left a few survivors of the common race in the islands ; that Malay was probably an Indo-European language,’ which last assertion was more particularly pressed by the illustrious grammarian Bopp. Mr. Crawfurd brought a local experience of forty years, and a knowledge of the vernaculars, to bear against the theories of Humboldt and Bopp, and in the dissertation in his *Malay Grammar* (1852) denied that the brown people belonged to one race ; he maintained that there were several brown races

speaking distinct languages; that there several races of Negritos also, and that the Polynesian languages, properly so called, were quite distinct from Malayan. There rests the controversy, involving the deepest questions of the sciences of Ethnology, Language, and Geology. It is scarcely necessary to add that Bopp's theory as to the Indo-European connexion of the Malayan sub-family has been condemned by Max Müller, Bréal, and all scholars of weight, in spite of their reverence to their great master in Comparative Philology. One great fact stands out, that, while the Malayan languages have had no effect whatever on the higher civilization of the Asiatic continent, on the other hand, wherever Malay and Javanese have been received by other islands of the archipelago, there will be found a higher stage of civilization.

"The Malays proper had their ancestral home in the interior of Sumatra, the region of Menangkaba: thence they colonized the coasts of Sumatra, the Peninsula of Malacca, the coasts of Borneo, and made their influence felt far beyond, as adventurous pirates and merchants. Their language being simple, and easily learnt, has readily adopted loan-words from the Sanskrit, Arabic, Persian, English, Portuguese, Dutch, Javanese, Telugu, and Chinese languages, avoiding allusion to the disputed main ingredients of primitive Malayan, and the great Polynesian. In the lower classes the primitive Malay would preponderate; in classical works the learned exotics. It is asserted that the Malay of Singapore and the State of Queddah in Malacca, is the most classical. There are several dialects, and among them the Achinese, which had certain characteristics connecting it with the Indo-Chinese, and Batta languages. If there ever was a written character, it has not survived the introduction of the well-known Arabic, with additional characters. A considerable literature exists, chiefly prose, but nothing of an original nature. Van der Tuuk pronounces, in the Journal of the Royal Asiatic Society, all existing dictionaries, whether English or Dutch, to be insufficient, and not up to the mark. Of the dialects the purest are the simplest. The Malay spoken at Batavia differs very much from that spoken in the original country. Of all languages the low or common Malay is the most readily acquired. It contains no hard gutturals, or difficult consonants: it is soft and musical, and has a nice blending of vowels and consonants. It has become the *lingua franca* in the Dutch colonies; all servants are addressed in it, and European children speak it before they know their own language. The Samsans of the Queddah State in the peninsula of Malacca are Siamese by race, and Muhammadans by religion, and speak a mixed language of Siamese and Malay.

"The written language is called Jawi, a Javanese word correlative of Kawi; it means 'common,' and is antithetical to the other, which is the 'abstruse' language. As the Malays have no learned language of their

own, they use the word *Kawi* as correlative to Arabic, the depository of all their learning, chiefly translations. In some species of composition the writers introduce Arabic terms, as a proof of their learning and religious attainments, but very few Semitic words have become actually part of the Malay language.

"The nouns have no accidents; gender is only sexual; number is indicated by a word of plurality; cases by prepositions; the only instance of an inflexion is to express a possessive; the idea of time in the verb is indicated by particles, but they are often omitted; the relation of the genitive is expressed by juxtaposition, and the governing words precede the governed; a verb is changed from neuter to active by affixing or prefixing certain inseparable particles; the adjectives follow the substantives; one part of speech is formed from another with great ease by prefixing a particle, and the same word in its primitive form is often used colloquially for several different parts of speech. As in the Hindustani language, Arabic and Sanskrit words can be incorporated into the Malay at the pleasure of the speaker. It has been for centuries the *lingua franca* of the Archipelago, and its simplicity, power of adaptation, and smoothness of pronunciation, make it one of the strong vernaculars of the East, likely to absorb its weaker neighbours. The best grammars are by Marsden, Crawford, in English; Etout, Favre, in French; Roorda von Eysinga, 1840, Tugault, Pijnappel, 1866, in Dutch. The dictionaries are by Crawford, Favre, Marsden, Pijnappel; one was commenced by Van der Wall, who died, but the work is to be continued by Van der Tuuk. The vocabularies, reading books, and treatises are without number in English, French, and Dutch. The Koran has been translated into Malay; the whole Bible has been translated both into High and Low Malay, and in both Arabic and Roman characters. Newbold, Crawford, Logan, and Favre give us vocabularies of the Orung Binwuh, and the Samang, but there is much room for further inquiry.

"The Javanese is the language of the island of Java and the adjacent portion of Sumatra; it has a high and a low form; it is the most improved and copious of the Malayan sub-family. Its written character, derived from the Indian, is used by the Sundanese, Balinese, Madurese, and people of Lombok, whether Balinese or Sassak, and partly in Borneo and Sumatra; its letters are not in the well-known classification of the Nagari; the character is perfect to suit the sounds of the language. The foreign ingredients of the language are very much the same as those of the Malay; the grammar and the syntax are very simple, and much is left to be gathered from the context; the general features of grammar are the same as those described in the Malay. The population of Java and Madura amounts to seventeen millions; but of these, four millions speak the Sundanese, and two the Madurese. The language is one of the most copious in the world,

but it is exuberant and redundant in some particulars, and meagre in others ; and the language of deference is made a study and science. The literature is threefold, Hindu, Arabic, and indigenous, and chiefly poetry. Arabic has made but a small impression on the Javanese, as they are only half Muhammadans. They write on palm-leaves or European and Chinese paper. The great proportion of words are dissyllables ; there are a great number of derivatives formed by inseparable particles. No treatise of grammar existed, but they had a kind of vocabulary of synonyms in lieu of a dictionary. The Koran and the Bible have been translated into Javanese.

“ The Sundanese, Madurese, and Balinese differ so materially from Javanese, though of the same stock, that they must be deemed separate languages, chiefly owing to the admixture of other languages. The Sundanese is the language of the mountaineers of the West of Java, Muhammadans, and is spoken by one-fourth of the population ; the letters of the alphabet are fewer ; this was probably the ancient language of the island, and has escaped the influence of foreign innovations ; an additional obsolete character has been discovered on ancient and rude stones. The Bible is being translated into Sundanese.

“ The Madurese is the language of the people of the island of Madura ; and the immigrants from that island into Java, about 300,000 souls, and Muhammadans. It has two dialects, the Madura proper and Sumanap, as distinct as Spanish and Portuguese. Latham gives vocabularies of both, and of Balinese. It is poorer and ruder than Javanese. Although the arm of the sea is only ten miles in width, the two languages are scarcely more alike than any other two of the Western Archipelago. The letters are fewer in number ; it has a dialect of ceremony, and epistolary correspondence, but Javanese is the language of business.

“ The Balinese is the sole language of the island of Bali, and has spread by conquest to the island of Lompok ; it is spoken by half a million ; rude and simple, yet more improved than the Sundanese and Madurese, and supplied with a copious dialect of deference, borrowed from Sanskrit and Javanese. In Bali writing is on the palm-leaf only, as was the old and obsolete practice of Java. The religion of the people is still Brahmanical and Buddhist, but their faith is blended with the local customs of the island, and the original tenets are much perverted by a semi-barbarous people. Buddhists and Brahmans live in perfect harmony. It is asserted, that there is as much difference between Balinese and its sister-language, as there is betwixt French and Italian. The lower classes speak a very distinct language indeed, such as was the language before the arrival of the Javanese into Bali. Sanskrit MSS. are still found, as well as Kawi MSS., which will be noted below. The British and Foreign Bible Society are in



correspondence with their agents in Holland concerning the printing of a translation in this language.

"We now proceed to notice the grammars and dictionaries of these last four languages:—

"**JAVANESE.**—*Dictionaries*: Gericke und Roorda, Javanese-Dutch; 2nd edition by Roorda, 1875; De Groot, out of date; Favre, Javanese-French. *Grammars*: De Groot, Dutch; Favre, French; Gericke, Dutch; Roorda, Dutch; Roorda, Short Grammar, 1874, Dutch.

"**SUNDANESE.**—P. Blissé and Raden Kathavimata, Dictionary Sundanese-Dutch; Gerding, Dictionary Sundanese-Dutch; J. Rigg, Dictionary Sundanese-English; Miss Coolsura, Manual of Sundanese-Dutch, 1873; Grasshuis, Sundanese Reading-book, Dutch.

"**MADURESE.**—A. C. Vreede, Hand-book, Dutch, in two parts, and Glossary, 1876.

"**BALINESE.**—Balinese-Dutch Dictionary, by R. Van Eck, Missionary, 1876; Balinese Grammar, by ditto, 1874.

"There is an abundant literature, and great interest attaches to the monumental inscriptions, which the Dutch scholars are making known to the public by beautiful lithographed texts and translations.

"Like many other nations, the Javanese were found to be possessed of an ancient and recondite language, in which their literature and religion is enshrined. This is called Kawi, which means 'refined,' as contrasted to the 'Jawi' or ordinary language. Raffles thought that it was a foreign language of unknown origin, imported into the island. Crawford saw its connexion with the Javanese, but deemed it to be a written language of the priests. Friederich saw that it was not so, for Sanskrit occupied that position, and that Kawi was the sacred language of the people. Von Humboldt, by a scholar-like analysis, found that it was merely an archaic form of Javanese, plentifully interlarded with Sanskrit terms. Dr. Kern, of Leyden University, who is perhaps the greatest living Kawi scholar, has favoured me with the following lines, which are important, as settling the question:

"'Kawi, or more properly Old Javanese, belongs to the Polynesian family, particularly to the Malayan branch. Next akin to it are Malay and Sundanese; it is the parent of modern Javanese; it represents the language as we have it from 800 to 1400 A. D., and it has largely borrowed from Sanskrit, just as modern Javanese, Malay, and the Dravidian languages have. The grammar is unaffected by foreign influence; its structure and genius are thoroughly Polynesian; it is no more an artificial language than English or Persian; it is somewhat richer in forms, and more abundant in pronouns than modern Javanese, but the genius and general outline survive in the latter. The style of the literary work is highly elaborate and finish-

ed. In the poetry there is much descriptive power, less of feeling and grandeur.'

"When the Muhammadans occupied Java, the Hindu religion and the Brahmans took refuge in the island of Bali, which has remained Hindu to this day. There the treasures of Kawi literature have been found, though many manuscripts are found in the island of Java also, and translations of old Kawi works into modern Javanese. Grammars and dictionaries do not exist, but most interesting texts are being published. The earliest and most famous treatise on the subject is that by Von Humboldt already alluded to. Short descriptions have been published, both by Kern and Van der Tuuk, and the Dutch scholars have made the subject their own. Dr. Friederich published a full account of Bali, and the late Dr. Cohen Stuart has published a collection of inscriptions of great interest. The whole of the literature is thoroughly Brahmanical and Buddhist, for the professors of both faiths lived apparently in harmony together. It must be borne in mind that both MSS. and inscriptions in pure Sanskrit are also found. Original versions of the great Sanskrit epics are found in Kawi, which are very important in their critical bearing on the original poems as we now have them.

"Separated by a narrow strait from Bali is the island of Lompok, but at this point we leave the Shallow-Sea plateau, and enter into a new world, as regards Fauna; but the Balinese emigrant has overleaped the boundary, and we find the sovereignty of the island possessed by Javanese in race, and Hindus akin to the Balinese in speech. The mass of the population are Sassaks, who are Muhammadans, and whose language is unintelligible to their masters, though many Sassak words are found in Malay; they have no indigenous character, but use that of the Balinese, the majority neither reading nor writing. Zollinger and Wallace give vocabularies.

"Separated by a narrow strait from Lompok is the island of Sumbawa. There are six separate languages; the two most considerable are the Sumbawa and the Bima. The people are all Muhammadans, with the exception of a few wild mountaineers. No indigenous character is now in use, but traces have been found of an ancient and obsolete character; the Bugi character of the Celebes Island is the one adopted. The third dialect, the Timoura, has kept its own numerals. Crawford, Leyden, Latham, and Raffles supply vocabularies.

"The large island of Floris or Eudè is said to have six distinct languages: 1. Eude, 2. Mangarei, 3. Kio, 4. Roka, 5. Konga, 6. Galeteng. Three of them have written characters. To judge from the vocabularies of two supplied by Crawford, there is an admixture of Malay and Javanese with indigenous vocables. The inhabitants are intermediate between Malayan and Papuan, and are pagans.

"The next island, Timour, bears that name as the most Eastern of the Malayan settlements; it is occupied by Malaysians and Negritos; the number of important languages is two; there is no written character, indigenous or adopted; one of them, the Timouri, is the *lingua franca* of the island. Latham and Crawford supply vocabularies. They are pagans, or, in some cases, Christians, as both the Dutch and Portuguese have settlements on the island.

"We must now return to the island of Sumatra to notice three remarkable languages, spoken by people of brown colour and Malayan stock, but very distinct from the Malay.

"First in order is the Batta or Batak, which has been studied and illustrated by the grammatical works of the distinguished scholar Van der Tuuk. There are three dialects, the Toba, the Mundailing, and the Dairi. The Battas are divided into many independent States, are pagans and cannibals, but are becoming Muhammadans; yet they are not civilized, have an indigenous alphabet, and write with a twig and ink made of soot upon bark and bamboo staves, from bottom to top, the lines being arranged from left to right, but this fact, as stated by Leyden, is doubted by Marsden; they have a literature both in prose and verse. Vocabularies are not wanting, but are superseded by the works of Van der Tuuk, Schreiber, Van Asselt, and Junghuhn. The language is said by the former to be nearest of kin to the old Javanese and Tagál. Schreiber considers it to have closer affinity with Malay. The New Testament is being translated into this language by the British and Foreign Bible Society; the translation is by the Rev. Mr. Nommensen, and it is edited by the Rev. Dr. Schreiber, both Protestant missionaries.

"The next is the Rejang, described as one of the most civilized nations of Sumatra. Though pagan, it has a peculiar language and an indigenous written character of its own. They write on bamboo slips, like the Battas. Their territory is chiefly inland, and quite independent. Leyden considered the language to be an admixture of Malay and Batta. There does not appear to be much literature. The old English settlement of Bencoolen was situated in their territory. Marsden gives a vocabulary.

"The third is the Lampung. The people who speak this language live on the coast separated from Java by the straits of Sunda. The language is quite peculiar, and has an indigenous written character; one-third of the vocables appear to be original. The people are rude, partly pagan, partly Muhammadan. A vocabulary is given by Marsden, but from the year 1868—1874 Van der Tuuk has turned his attention to this language and has published several treatises, but nothing amounting to a dictionary or grammar.

"To these three tribes in the island of Sumatra may be added the

Korinchi, the inhabitants of a hitherto unexplored valley. They are Malay, Muhammadans, and speak Malay, but use a special alphabet of their own. An expedition has been fitted out this year by the Dutch Geographical Society, one of the objects of which is to penetrate into this valley. There are some savage races also, among which we have notices of the Loeboes and Oeloes by Willer and Netscher in Dutch, 1855.

"Of the language of the inhabitants of the numerous groups of islands lying off Sumatra we know little or nothing. Vocabularies are given by Marsden, and by Shortt in the *Malayan Miscellanies*, of the Niaz dialect, and the Gospel of St. Luke has been translated into that idiom by the British and Foreign Bible Society. Of the dialects of the inhabitants of the Engano Islands, we have Dutch vocabularies by De Straaten and Severyn; it is totally unintelligible to the Malays; all these races are pagans, and in a very low state of civilization.

"We cross the Java Sea to Borneo, situated on the Equator, and the greatest island in the world, three times the size of Great Britain. Of the interior we know little or nothing. Crawford is of opinion, that there may be scores of tribes speaking different languages, but they are all savages, and mostly cannibals. No respectable indigenous civilization has sprung up on the island. The coasts have been occupied by Malay settlers for more than two thousand years, who in due time brought with them Muhammadanism. Bugis have settled from the East, and are of the same faith. The Javanese have made settlements and introduced Hinduism, leaving traces in ruined temples and names of places. The Chinese have settled on the northern coast. The indigenous population is pagan, and called by the generic word Dhyak. There is no alphabet, but an inscription in an unknown tongue has been found in the interior; the natives have a kind of symbolic mode of communication by notches on arrows. The greatest known tribe is the Kayan. We have a vocabulary by Burn of 800 words; Crawford gives a vocabulary of nine languages, the Kayan, Pido-Petak, Binjuk, and others. With the Muhammadan religion, the Malay language is adopted. Latham remarks that the Binjuk are maritime, and the Dhyaks landmen. The Dutch possess half the island, with a population of one million and a quarter; the Sultan of Brunè, a name identical with Borneo, the remainder; the titles to Sarawak and Labuiau are both held of him. Gabelentz published a Dhyak grammar in 1852, following that of Hardeland in 1850, who also published a dictionary in 1859; there is another anonymous Grammar dated 1856: the whole Bible has been translated by Hardeland; Crawford treats of the peculiarities of the language in his *Malay Grammar*; Sir J. Brooke gives a vocabulary; Von Kessel published a glossary of the dialects of the West Coast in 1849, and Tiedke a glossary of the Sanpit and Katingan in 1872; both are in Dutch.

“To the east, and separated by the Macassar Straits, is the curiously-shaped island of Celebes, the centre of a civilization independent of Java; the population at a remote period were Hindu. The Muhammadans had only just arrived, when the Christians came on the field; a certain proportion of the people are Protestant Christians, as the Dutch power is paramount. The language and literature essentially differ from that of Java and Malay; there is a distinct written character in use, preserving the classification of the Nagari, but differing in appearance; there is also another and obsolete alphabet; there are two great languages, with a literature, the Bugi or Wugi, and the Mangkasara or Macassar; there are other languages, the Mandhan, Buton, Salayer, Tomore, Garontolo, and Menado, and some are spoken by savages. The Bugi are a powerful people, and their literature copious, but both languages have a soft and vocalic pronunciation. The grammar is exceedingly simple, but differing in many particulars widely from the Malay and Javanese; out of 1700 words 1300 are native, the remainder loan-words from Malay and Javanese; their language has exerted an influence upon other islands; they have an ancient literature and laws, and by some are asserted to have an archaic language, but no specimen has been obtained. The Macassar and Bugi are not dialects of the same language, though they have much in common; they are mutually unintelligible. To Dr. Matthes we are indebted for grammars, dictionaries, an essay on folklore, selections, and a translation of a portion of the Bible both in Bugi and Macassar. Vocabularies are supplied by Crawford, Thompson, Leyden, Raffles, and others; a vocabulary of the dialects of Tomore, Buton, Salayer, is supplied by Wallace, one of Menado by Latham, and of Mandhan and Buton by Raffles. The Koran has been translated into Bugi. Professor Niemann gives instruction in Bugi and Macassar in the College for Training Dutch Colonial Servants at Delft in Holland. There are several languages spoken in the Celebes by the Alfura, or Harafura, or Turajah, head-hunting savage races. We have contributions from several Dutch scholars, Jansen, Rhidell, and Professor Niemann, 1866, and others. The flourishing Dutch settlement of Minahassa is in their neighbourhood. We have a translation of the Bible by Herman in one of these languages, a catechism in Malay and Alfura by the same, and materials for a dictionary by Millies. There is no written character, and indeed very little is known as to the names and numbers of these languages.

“Crossing the Molucca Passage to the east, we come to the Spice-Islands. It was here that the Portuguese were met in 1521 by Magellan and the Spaniards, who had crossed the Pacific from the west. We find that then, as now, the Malay language was the language of commerce, yet each island, Amboyna, Tidor, Ternate, Banda, Gilolo, and others, had preserved their peculiar languages totally different from Malay. There was no

kind of alphabet in the Spice-Islands : the Roman and Malay characters are now used, and the people of Amboyna are nominally Protestant Christians. In the other islands the inhabitants are pagans, with a sprinkling of Muhammadans. M. Van Hoewell, jun., has this year published remarks in Dutch on the five leading dialects of Amboyna, Sassarúa, Hurunka, Nusalaut, Hila, Nagari-anpat, with a glossary. He remarks that these languages had been much neglected. Vocabularies of different degrees of fullness are available in the works of Wallace, Crawford, Raffles, Bickmore, Leyden, De Clerq, Van Edris, and other Dutch writers. It would be a mere recapitulation of names of uncertain value and number to set out the groups of letters by which the forty-two languages, mentioned by Wallace, are expressed, though there is no doubt of the genuineness and accuracy of his lists.

“Proceeding northwards we come to the Philippine Islands, a new linguistic world, and the colonies of the Spaniards. The two great languages are the Tagál and the Bisayan, but there are many hundred islands, and we need not be surprised to hear of many dialects, among which the Pampanga, Jambal, Pangasinan, Ilocos, Cagayan, Camarines, Batanes, Chamena, are the best known. The residents of the different islands are not mutually intelligible ; out of a population of three millions and a half, called by the Spaniards the Indios, one-third speak a variety of Bisayan and two-thirds a variety of Tagál ; vocabularies of about thirty exist. The Roman Catholic friars have played a great missionary and political part here, and the majority of the population is nominally Christian. One of the islands enjoys independence and Muhammadanism. Savage unsubdued tribes occupy the mountainous interior of the chief island, Luzon ; some of them are Negritos, of numbers unknown, and all pagans. There is one indigenous alphabet, though the Spanish authors, who are not authorities in linguistic science, assert the existence of many, but produce no proofs. It is written with an iron stile on bambus or palm-leaves, and in Chinese fashion from top to bottom.

“The great feature of the language of this group is polysyllabism, and the blending of noun and verb into a single word, and the difficulty of tracing the roots of either is a cause of perplexity. The changes are most complex ; perfect familiarity with every form that a word can assume, not only by addition of particles, but interchange of letters, is necessary to enable a person to detect the radix, which, according to Leyden, is more disguised than in Arabic derivatives. Nouns have no accidents ; verbs have moods or tenses, but have no pronominalization to indicate number and person ; the inverted sentence-construction of the passive is preferred to that of the active ; the plural of nouns is formed by a particular prefix instead of an adjective following ; in verbs, inseparable particles are used, instead of auxiliaries, to mark time.

“The number of synonyms to represent one idea is enormous. Crawford remarks that several of the languages have arrived at a high degree of culture, and differ greatly in structure from the Malay and Javanese. Humboldt asserted that the Tagál was the most perfect specimen, and the parent language of the Malayan family, which is, of course, denied by Crawford. We have a plentiful linguistic literature in Spanish, and Crawford describes the languages scientifically in the Preface to his Malay Grammar; but of an indigenous literature we have but an uncertain account, for it appears, that the early missionaries extirpated the original memorials of the race with pious care, supplanting the precious remains of national and pagan antiquity with hymns, church-legends, and the religious life of Thomas à Kempis in the Roman character. Of grammar, which the Spaniards term ‘Arte,’ we have one in Tagál by Buyeta; in Bisayan by the same, in Pampagna by Bergnano, in Ilocos by Lopez and Bergnano. We have dictionaries or vocabularies in Tagál by De Las Santos, Noceda, Buona Ventura and Mallet; in Bisayan by Montrida and Sanchez, in Pampagna by Bergnano, in Ilocos by Carro.

“Eighty miles across the China Sea is the island of Formosa or Taiwan, part of the Chinese empire. Its coasts and plains are occupied by Amoy-Chinese emigrants, but its mountainous interior is occupied by people of the Malayan race, the furthest eastern outwork of that great family; beyond it the Japanese dialects commence. European missionaries are now settled among this people, and Von Gabelentz, Klaproth, and Crawford have written about their language; and in later years we have essays by M. Guérin, M. Favre, Professor of Malay at the Cours Orientales at Paris, and Mr. Taintor, of the English Consular Service; vocabularies accompany the grammatical notices. There is reason to believe, that the Malayan race passed from the Philippines into this island; they are either found in a demi-civilized state given to agriculture, and are then known as Kabaran or Pepu-kwan, ‘savages of the plain,’ or as Yukan, downright savages of the mountains. Vocabularies of both dialects are given, and contrasted with the Tagál, Malay, Javanese Sassak, and Malagasie. They are pagans, and have never made any progress in civilization, being either in subjection to the Chinese, or in savage liberty; they have neither written character nor literature; there is an entire absence of Sanskrit words, which marks the period of the Malayan colonization to be anterior to the Hindu conquest of Java; intercourse with the rest of the Malayan race must have been very slack, and the influence of the Chinese conquest upon the language very strong.

“At a distance of many degrees to the West, separated from Africa by the Mozambique Channel, is the island of Madagascar, the most western outwork of the Malayan race. Mr. Crawford asserted that the Malagasies

were a Negrito people of African blood, with a slight admixture of the Malayan in their blood and language, from pirates or tempest-driven vessels off the island of Sumatra. Humboldt led the van in the theory of a Malayan origin; and since the island of Madagascar has become better known, and the residence of missionaries, his opinion is gaining ground. A dictionary was published by Mr. Freeman forty years ago, and indeed one by Flacourt, in French, more than two hundred years ago. An outline of a Malagasie grammar has been published by Van der Tuuk, the celebrated Malay scholar, and a translation of the New Testament. The Rev. Dr. Mullens, of the London Missionary Society, in a paper read before the Geographical Society, 1875, has expressed the latest opinion, and quotes the following opinion of the Rev. Mr. Cousin, a missionary of standing, who has been selected by all the Protestant Missions in the island to the responsible task of revising the Bible, which is being done now thoroughly, proof-sheets being sent for revision to each missionary. 'The language is one, a Malay tongue with three or four chief dialects, and an admixture of foreign words brought in the intercourse of trade.' Van der Tuuk agrees in the above, and remarks that the Malagasie is like the Toba dialect of the Batta language in the island of Sumatra, above described; that there are resemblances to Javanese, Batta, Malay, and Dhyak of Borneo; and that it must have come from the west coast of Sumatra, after an admixture with a language resembling that of the island of Niaz. Certainly the words in Malagasie are very long indeed; Malay and Javanese roots are bisyllabic, and prefixes monosyllabic; while in Malagasie we have prefixes and affixes of three syllables, extending the length of some words to a monstrous extent; and it must be admitted, that the Malagasies are a dark race, speaking apparently the language of the brown races of the Archipelago. There are no Sanskrit words in the Malagasie; therefore the connexion must date back to a period before the immigration of the Hindus. The Malagasies are pagans. There is no written character, and the missionaries have introduced the Roman character, and a code of laws has been printed. According to French authorities, the Arabic character was once used, the power of the letters being somewhat modified. In addition to the books mentioned above, we have French treatises by D'Urville, Marre de Marin, and Dalmont; a grammar, by Griffiths, of the Ankova dialect; the other two dialects are the Sakalava and Betsimi Saraka; a French-Malagasie dictionary is now being published by M. Marre de Marin; there are also vocabularies by Wallace, Crawford, Challaud, Drury, and John. Owing to the intercourse with the French, a great many French words have crept in. The population is about two and a half millions, according to Dr. Mullens' careful estimate, and christianity is on the increase. It forms an independent state.



"We have thus swept into our net all the languages, which can possibly be connected with Asia, from the extreme western frontier of India up to the boundaries of China. The region is interesting, as lying betwixt two great civilizations, that of India and China, and partaking, to a certain extent, of both, but in different degrees. Here we come on the language of a great people, fully described in the Report of 1875 by Dr. Legge. South of the islands of the Indian Archipelago, which are situated on a plateau of *Shallow-Sea*, lie the *Deep-Sea* islands of the Austral Archipelago, with a plurality of languages requiring another collector and classifier. Beyond China and Japan, described this year by M. de Rosny, lie the fresh fields and pastures new of the Mongolic and Tungussic families, as far east as the distant Corean. If this harvest be in a future year garnered, it will fill up the space in Eastern Asia beyond the region of the Turkic family, which has found this year so able a reporter in M. Pavet de Courteille. To the west and north of this family lies the Ugro-Finnic family, last year (1876) reported on by M. Ujfalvy, and the Samoidic, which is not yet disposed of. On the south-west confines of Asia is the Caucasian group, furnishing an ample study.

"Original investigations have their value, and, if based upon facts and legitimate inductions, are a contribution to positive knowledge; but a grouping and arranging of such facts in a collective and popular form, and thus rendering available the sporadic contributions of many minds, has also its value; and the first step towards supplying the lacunæ of our actual knowledge is to take stock of our possessions, and indicate what is the work left to be done by future investigators.

"The papers, of which the report is composed, are original compositions of eight to ten English and foreign authors, and the information supplied will beget and render possible future special studies. To a certain extent they are more readable and attractive to outsiders than learned discussions on special subjects. It may be mentioned that the paper on Non-Aryan Languages of India, contained in our report of last year, has been reprinted in a Philological journal in Paris and the journal of a learned Society in Calcutta. Original views are sparingly brought forward in these reports; the statements of others are quoted for what they are worth; herein is the main difference of a popularizing report and an original research.

"The range of the Himalayas are a great linguistic watershed of a most unique and interesting kind. A profound study of the Non-Aryan Languages of India, Indo-Chinese Peninsula, and the Indian Archipelago may some day furnish materials for a wider induction of grammatical principles than was possible to the limited knowledge available to Bopp, Humboldt, and Max Müller. We seem to catch the first effects of the human

race *in situ*, not in a state of hopeless savagery, as in Australia and America, but in a graduated scale of improved and improving languages. In the rear of the Himalaya is the great monosyllabic Chinese; the flank is turned by every possible combination of the Agglutinative method; in their front is the great Inflecting Word-system of the elder family of the Aryans, destined in the Vernacular to incorporate Semitic vocables. Thus from these languages may, possibly, at some future period, be gathered the connecting links between the great Orders of Human Speech."

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### LIBRARY.

The following additions have been made to the Library since the Meeting held in August last

#### TRANSACTIONS, PROCEEDINGS, AND JOURNALS, *presented by the respective Societies or Editors.*

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Marz. *H. C. Vogel*.—Spectral-Photometrische Untersuchungen insbesondere zur Bestimmung der Absorption der die Sonne umgebenden Gashülle.

Mai. *von Martens*.—Uebersicht der während der Reise um die Erde in den Jahren 1874—1876 auf S. M. Schiff *Gazelle* gesammelten Land und Süßwasser-Mollusken.

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Pt. 72. *Dr. Caldwell*.—Sepulchral Urns in Southern India. *Prof. A. Weber*.—On the Krishnajanmashtami, or Krishna's birth-festival.

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*Dr. O. Feistmantel*.—Jurassic (Liassic) flora of the Rajmahal group from Gola-pili (near Ellore) South Godavari District.

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No. 1. *C. E. Burton*.—On a Spectroscope of the Binocular Form for the Observation of Faint Spectra.

No. 5. *A. Macalister*.—Notes on some Anomalies in the course of Nerves in Man. *Rev. T. R. Robinson*.—On the Theory of the Cup Anemometer, and the Determination of its Constants. *G. H. Kinahan*.—The Drifting Power of Tidal Currents, *v.* that of Windwaves.

No. 6. *J. L. E. Dreyer*.—On Personal Errors in Astronomical Transit Observations.

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No. 10. *Rev. J. H. Jellet*.—Researches in Chemical Optics.

No. 11. *B. B. Stoney*.—Report on the Strength of Single-riveted Lap Joints.

No. 14. *A. Macalister*.—Report on the Anatomy of Insectivorous Edentates.

No. 15. *J. G. Baker*.—Report on the Seychelles Fern Flora.

No. 18. *Dr. W. R. MacMab*.—Experiments on the movements of Water in Plants (Pt. 2).

Gravenhage. *Bijdragen tot de Taal, Land, en Volkenkunde von Nederlandsch-Indië*.—*Volgreeks* 3, Deel 10, Stucken 2—3, en Deel 11, Stucken 1—2; *Volgreeks* 4, Deel 1, Stuk. 1.

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No. 7. *T. W. Saunders*.—The Himalayan System. The India-rubber trees in Brazil.

No. 9. *Major H. Wood*.—Note on the Drainage of the Upper Oxus Basin. *E. W. Pringle*.—Extension of the Malabar Coast.

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*H. Kirk*.—On Homogeneous Iron, and the degrees of Homogeneity to be expected in Iron produced by various systems of Puddling and subsequent working. *E. H. Carbutt*.—On Root's Mine Ventilator, and other applications of Root's Blower. *L. Perkins*.—On Steam Boilers and Engines for High Pressures.

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No. 181. *G. J. Romanes*.—Further Observations on the Modification of the Excitability of Motor Nerves produced by Injury. *G. M. Whipple*.—On the Temperature-correction and Induction-co-efficients of Magnets. *W. De la Rue*.—On the length of the Spark from a Voltaic Battery in different Gases at ordinary Atmospheric Pressures. *J. Tyndall*.—Further researches on the Deportment and Vital Resistance of Putrefactive and Infective Organisms from a Physical point of view. *General Strachey*.—On the alleged Correspondence of the Rainfall at Madras with the Sun-spot Period, and on the True Criterion of Periodicity in a series of variable Quantities. *W. D. Niven*.—On the Calculation of the Trajectories of Shot,

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No. 6. *Capt. W. M. Campbell*.—On a Peculiarity of Personal Equation. *Mr. Struve*.—Note on a Deviation of the Plumbline.

No. 7. *Mr. Penrose*.—Description of an Improved Diagram for the Graphical Solution of Spherical Triangles, applicable to the questions arising out of the Spheroidal Figure of the Earth, treated in the Paper read before the Society November 10, ult, and further illustrated by the case of the Prediction of Occulations. *M. de Boë*.—On a Method of Destroying the Vibrations on a Mercurial Reflector. *General Meig's*.—On a Method of Making a Pendulum swing in an approximately Cycloidal Arc.

No. 8. *Prof. Zenger*.—A new Solar Eye-piece.

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No. 4. *Buchanan*.—On the Distribution of Salt in the Ocean as indicated by the Specific Gravity of its Waters. *Carpenter*.—Lecture on the Temperature of the Deep Sea bottom and the conditions by which it is determined. *Trotter*.—The Pundit's Journey from Leh to Lhása and return to India *viâ* Assam.

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*E. W. H. Holdsworth.*—Exhibition of, and remarks on, a specimen of *Geocichla Layardi*, obtained at Jaffna, Ceylon.

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*C. M. v. Bauernfeind.*—Das Bayerische Präcisions-Nivellement, Pt. 4. *H. von Schlagintweit-Sakunlinski.* Klimatischer Charakter der pflanzengeographischen Regionen Hochasiens mit vergleichenden Daten über die angrenzenden Gebiete.

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6. Protuberanzee macchie solari osservate alla Specola del Collegio Romano nell' aprile 1877 et nel maggio 1877. *P. Tacchini.*—Macchie solari e facole. osservate a Palermo nei mesi di maggio e giugno 1877. Eruzione solare metallica osservata a Palermo al 14 Giugno 1877.

7. Imagine spettroscopiche del bordo solare disegnate a Roma e Palermo nei mesi di Marzo ed Aprile 1876 da Secchi, Ferrari, e Tacchini. Immagini spettroscopiche del bordo solare disegnate a Roma e Palermo nel maggio 1876 da Secchi, Ferrari, e Tacchini.

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Octobre, Liv. 3. *M. P. Merruau*.—La Politique Française en Cochinchine.

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No. 1. *H. Spencer*.—La Science Sociale.

No. 6. La Météorologie en France, projet de réorganisation.

No. 7. *M. Berthelot*.—Les cités animales et leur évolution. L'exploration des chemins de fer.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR DECEMBER, 1877.

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The Monthly General Meeting of the Asiatic Society of Bengal, was held on Wednesday, the 5th December, at 9 P. M.

Major-General H. L. THUILLIER, R. A., C. S. I., Vice-President, in the Chair.

The following presentations were announced :—

1. From H. Blochmann, Esq., a copy of the *Maqámát-i-Badí'-i-Hamadání*, lately lithographed at Lucknow.

2. From J. McCrady, Esq., a copy of the following papers read before the Elliot Society :

Description of the Oceanic (*Turritopsis*) *Nubricula*, N. S. and the Embryological History of a singular Medusan larva, found in the cavity of its belt.

*Gymnophthalmata* of Charleston Harbor.

3. From the Trustees of the British Museum the following books : Description of Ancient Marbles, Pts. I to XI, Catalogues of Fossil Reptilia of South Africa, British *Hymenoptera*, British Fossil Crustacea, Birds, Typical specimens of Lepidoptera Heterocera, and a Guide to the Exhibition Rooms in the Departments of Natural History and Antiquities.

The following gentlemen, duly proposed and seconded at the last Meeting, were balloted for and elected ordinary members—

Dr. Krishna Dhán Ghose.

L. Mandelli, Esq.

The following are candidates for ballot at the next meeting—

1. Lieut. H. A. Sawyer, B. S. C., Military Department, Calcutta, proposed by Captain J. Waterhouse, seconded by H. Blochmann, Esq.

2. Alexander Ward, Esq., M. R. C. S., proposed by Dr. J. M. Foster, seconded by H. Blochmann, Esq.

The CHAIRMAN announced that Dr. Wise had compounded for his subscriptions by the payment of Rs. 230, and Mr. Alex. Grant, on payment of Rs. 332.

The CHAIRMAN said—

It would be in the recollection of Members of the Society that at the Meeting in November last year the Society sanctioned a proposal of the Council for the demolition of the present boundary wall in Park Street and the erection in its place of a dwarf wall and railings, with two gateways and a durwan's lodge, at a cost of Rs. 4,469. Arrangements were accordingly made for putting the work in hand, but the Council found some difficulty in selecting any really suitable railing for the site within the cost sanctioned. Meanwhile it was ascertained that the Municipality desired to obtain a slip of the Society's ground to improve the approaches of Park Street. In this view, and as one of the principal objects of erecting a railing was to beautify the approach to Park Street, it was thought that the Municipality, on receiving the ground required, would be willing to bear part of the expense of putting up the new railings, and with their help a handsome railing could be put up at a less cost to the Society than an ordinary railing would have been.

Informal proposals made to the Chairman of the Municipality on this basis were favourably entertained by him, and the Engineer of the Corporation was instructed to prepare a design and estimate for the railing and gateways required by the Society.

On the 20th August the Secretary of the Society received a note from Mr. Metcalfe forwarding copies of a very handsome design for the railing, and stating that its estimated cost would be Rs. 9,370 of which the Municipality would pay Rs. 2,000.

As the share of the expense, amounting to Rs. 7,370, the Society was thus expected to pay, was considerably in excess of the sum sanctioned, it was represented to Mr. Metcalfe that the Society could not possibly afford so much, and it was hoped that a less expensive design could be fixed upon.

In September last, when Park Street was under repairs and arrangements had already been made by the Municipality to widen the roadway by narrowing the footpath, the Municipality were anxious to take immediate possession of the strip of land required to widen the footpath, and the Secretary to the Corporation wrote stating that the Commissioners had under consideration certain proposals for improving the entrance into Park Street from Chowringhee, and forwarded a plan showing a strip of land belonging to the Society, which the Commissioners wished to purchase. The size of the strip was estimated at 8 chittacks and its value at Rs. 255/9, at the rate of Rs. 500 per cottah, but as the Commissioners wished to have

possession of the land at once, they were willing to pay 15 per cent. on the Surveyor's valuation, or say, Rs. 300 for the strip. They further undertook to pull down the wall and purchase the rubbish for their roads, temporarily putting up a wire fencing to prevent encroachments on the grounds of the Society.

Before submitting this letter to the Council, the Secretary wrote to Mr. Turnbull, to the effect that if the Municipality wished to acquire the land and demolish the wall, they must, in addition to the value of the land, give compensation to the Society for the damage done to the wall and gateway at least equal to the cost of replacing them, roughly estimated at Rs. 1,500. This the Municipality declined to do, as they considered the terms offered very fair because the wall &c. had already been condemned.

On this correspondence being referred to the Council they resolved, in order to endeavour to settle the question which had been long pending, that they would not sell any land belonging to the Society, but if the Municipality wished to improve the site at the corner of Park Street by widening the roadway, and would replace the present boundary wall of the Society's premises by a handsome railing with two gateways and a durwan's lodge, the Council were willing to give the strip of land required to widen the roadway, together with a money payment equal to half the cost of putting up the railing, up to a limit of Rs. 3000. This proposal was communicated to Mr. Metcalfe, who said he would be unable to accept it because the Finance Committee of the Corporation would object on principle to giving money for the railings, and he proposed as an alternative—

(a.) That the Municipality remove the present wall at their own expense.

(b.) That they pay the Society for the value of the materials removed.

(c.) That the Municipality put up a seven-strand neat twisted wire fence with iron standards, properly stretched, with two gates. The work to be neatly done and painted.

These propositions were declined by the Council because they felt that if the Municipality wished to acquire ground for a public purpose, they were bound to give the Society at least the compensation to which they were entitled under the Land Acquisition Act, comprising the value of the land plus 15 per cent. and full compensation for all damage or loss caused by the demolition of the walls, especially as the object for which the Society was willing to cede a portion of its land to the town would not be gained, and the whole burden of putting up the railings would thus be thrown upon the Society.

Since this reply of the Council no further steps have been taken in the matter, nor have any communications been received from the Municipality on the subject, but the Council hope that an arrangement may soon

be come to which will result in the long-desired improvement being carried out.

The Chair was then taken by the President, the Hon. Sir E. C. BAYLEY, K. C. S. I.

Mr. R. S. BROUGH read the following note on Professor Graham Bell's Telephone—

*Prof. Graham Bell's Telephone.*

With the aid of the report of the admirable description of Prof. Bell's Telephone, given by Mr. W. H. Preece before the meeting of the British Association at Plymouth, and of the excellent papers recently published on the same subject in "Nature," the "Engineer," and "Engineering," we have been enabled to make up a few for experimental purposes in the Telegraph Workshops at Alipore; and, as I have no doubt many Members of the Society are anxious to make themselves practically acquainted with these most ingenious instruments, I have ventured, at the instance of the Honorary General Secretary, to place a pair before you this evening.

Before proceeding to illustrate practically the working of the Telephones, it will perhaps be generally acceptable if I give a brief preliminary explanation of their principle and construction.

I will follow Mr. Preece in recalling to mind the fact that the character of a musical note, that is of a sensible periodic sound, is determined by its condition with respect to three qualities, namely, *pitch*, *timbre*, and *intensity*.

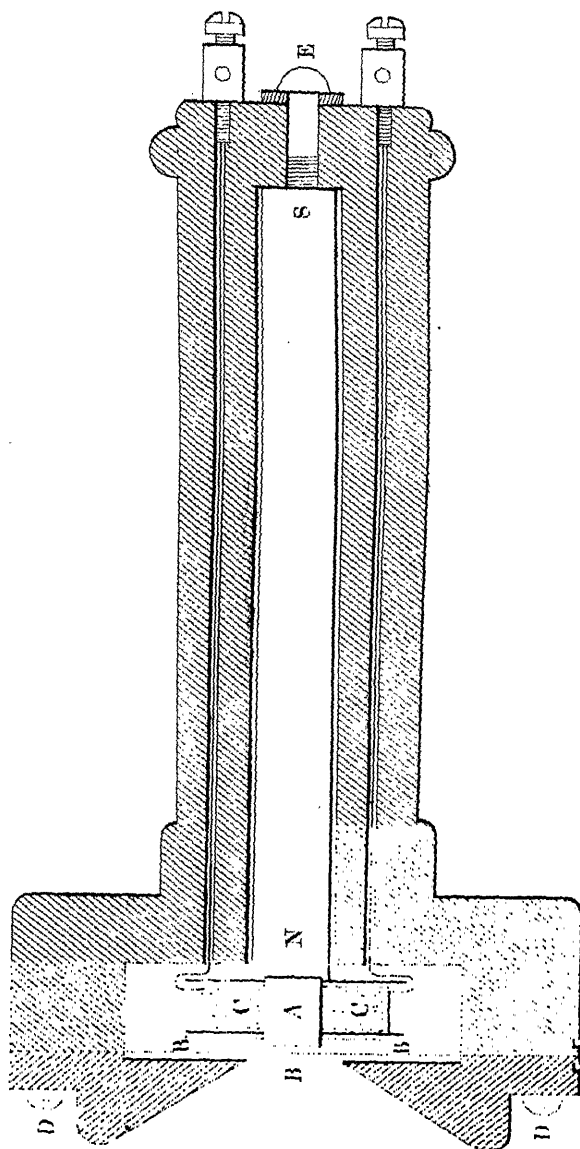
The *pitch*, increasing as the period of the note diminishes, will vary directly as the number of vibrations per unit of time.

The *timbre*, as Helmholtz has shewn, depends on the harmonics of the fundamental simple vibration, which are present.

While the *intensity* increases and diminishes with the amplitude of the vibrations.

Theoretically speaking, the transmission of different notes, in so far as regards only their different pitches, by means of electricity is a comparatively simple thing. We have only to arrange so that when we sound the note to be transmitted at, what in Telegraph parlance I shall call, the "sending station," its vibrations shall be communicated to a moveable conductor, which shall make and break contact between a battery and the line with the precise frequency of the vibrations it takes up. Thus for each contact made, a current will be sent to the line; and a series of periodic currents will be received at the distant station, the length of whose period will depend on the pitch of the note sounded at the sending station. These

PROFESSOR GRAHAM BELL'S TELEPHONE.



FULL SIZE



periodic currents being made to operate, a suitable receiver (electro-magnetic, as in Reiss's: or electrostatic as in Varley's) in the distant station will there reproduce a note of precisely the same pitch as the note originally sounded in the sending station.

By this arrangement each contact made in the sending station will transmit a current of definite magnitude, depending on the strength of the battery employed. All the current waves thus sent to the line will be precisely similar, and the only way we can modify them is in regard to the rapidity with which they follow one another.

Hence the note reproduced in the distant station will represent the original note in pitch only; the fundamental vibration will be the same, but bereft of all its harmonics. Any characteristic timbre the received note may possess will be entirely due to the nature of the receiving apparatus, and not in any degree to that of the sending apparatus.

Such, in its main features, was the Telephone of Reiss—a mere “tone” Telephone, reproducing the pitch, but losing the timbre. It is noteworthy that in such a Telephone, the intensity of the received note is entirely independent of the intensity of the original note. So long as the original note is strong enough to efficiently work the battery contact, we can, within certain limits, vary the intensity of the received note at pleasure, by varying the strength of the battery employed.

Now the Telephone before you not only conveys the pitch, but also reproduces the timbre with such exquisite accuracy, that a known voice is at once recognized by the ear. Moreover, it is not only sensible to musical tones, clang-tint and all, but to any noise, so that it is essentially a “sound transmitter.”

To facilitate the comprehension of the construction of the instrument, I have had a large-scale section drawn. *NS* is a hard steel rod, permanently magnetized. (See Plate III.).

*A* is a short piece of soft iron, of somewhat smaller diameter than the rod, screwed in to its end *N*. *A* becomes magnetized by induction, so that virtually *AS* forms a single magnet.

*B* is a circular elastic diaphragm of soft iron about four thousandths of an inch thick.

*CC* is a narrow circular coil, of the thinnest silk-covered copper wire, surrounding the iron core *A*.

*DED* is a light cylindrical wooden case.

The magnet *NS* is fixed to the wooden case by means of a screw at *E*.

The diaphragm *B* is fixed to the wooden case at *DD*.

The hollow part of the case surrounding the coil *CC* acts as a resonator.

This constitutes the whole apparatus. The apparatus in the sending



and receiving stations are precisely similar. We have simply to connect the one end of the coil of wire in each station to the line wire, and the other end to the return wire or to earth.

The currents are produced magneto-electrically at the sending end of the line, and are received electro-magnetically at the distant end.

Now returning to the figure we see that we have a soft iron induced magnet *A* surrounded by a coil of wire *C*, and opposite the end of the soft iron core *A* we have the soft iron diaphragm *B*.

Lines of magnetic force radiate away from the core *A*, some towards the disc *B*, others away from the disc towards the distant end *S* of the permanent magnet. These lines of force penetrate through the coil of wire *C*.

So long as the disc *B* remains at rest, the lines of force emanating from *A* remain stationary; but if the disc *B* be moved in towards or out from *A*, the lines of force will increase or decrease in number and will change in direction.

When the lines of force move, they cut the convolutions of the coil of wire *C* at right angles. Now we know that if we move a conductor across the lines of force in a fixed magnetic field, or, what is the equivalent, as in this case, move the lines of force across a fixed conductor, an electromotive force is produced in the conductor.

Hence in this case, motions of the disc *B* will produce electromotive forces in the wire of the coil *C*.

In fact, if we attach the ends of the wire of the coil *C* to the terminals of a sensitive galvanometer, and press the disc *B* in with our finger, we shall see a throw of the needle in one direction, indicating a transient current through the galvanometer. Holding the disc *B* pressed in until the index of the galvanometer comes to rest, and then releasing it, we shall see a throw of the needle in the opposite direction, indicating a transient current through the galvanometer in the reverse direction to the first. (Mr. Brough showed this experimentally with a Thomson's Reflecting Galvanometer.)

The relative direction of the current is in each case, according to Lenz's Law, which is only a statement of a particular case of the general Law of the Conservation of Energy, such that the magnetic field it produces tends to resist the motion impressed on the diaphragm *B*. Knowing the polarity of the permanent magnet *NS*, we can at once infer the absolute direction of each current from Ampère's Rule.

When we press the diaphragm in, we have to do work. Part of the work thus done takes the form of the potential energy of the bent diaphragm, while the other part takes the kinetic form of the transmitted electrical current. When we release the diaphragm, it returns to its initial

position, in virtue of its elasticity, and its potential energy is converted into the kinetic form of an electric current transmitted in the reverse direction to the first.

The magnitude of the electromotive force produced in the coil will be proportional to the number of lines of force cut through per unit of time; and will, therefore, be clearly proportional to the rate of displacement of the diaphragm *B*, and thence to the energy of the impact we impress on the disc *B*.

Small impacts will produce small electromotive forces: large impacts large electromotive forces.

Moreover, the inertia of the diaphragm is so small, that it is always ready to receive fresh impressions, which will be simply super-imposed on those already existing.

Lastly, the iron core *A* being so short relatively to its diameter, and being initially so highly magnetized, readily receives and loses the small accessions of magnetism to which it is subjected.

The result of all this is, that variations of pressure on the disc *B* will always give rise to electromotive forces proportional to their magnitude.

Thus if we sound a note in front of the disc *B*, not only will it impart its fundamental vibration to the disc, but also the subsidiary vibrations representing its harmonics.

Hence, not only will a principal periodic electromotive force, corresponding to the fundamental vibration of the note, be generated in the coil *C*, but also minor electromotive forces, corresponding to the harmonics.

And, finally, not only will a series of principal current waves, corresponding to the fundamental vibration, be sent to the line, but on their contour will be impressed the minor undulations of electrical potential representing the timbre of the original note.

The action of the apparatus in the receiving station will be at once apparent. There, the received currents flowing through the coil of wire, in their turn re-act on the diaphragm *B*. The diaphragm, like the mirror of Thomson's Cable Galvanometer, has no fixed zero, but is ready at every moment to follow each wave. The motion of the diaphragm sets the air in vibration, and reproduces the original note.

The sensibility of the apparatus as a receiving instrument is extraordinary. Certainly the *strongest* current with which it is at any moment worked does not exceed  $\frac{1}{1,000,000,000}$  of the centimetre-gramme-second unit current. The current with which our relays are worked in India is 400,000 times as strong.

The practical objection to the instrument in its present form is that the forces concerned are so microscopic. The consequence is that the

sound produced by it is feeble; and that its action is easily interfered with by induction. It is impossible to employ it on one of a number of over-land wires, while the other wires are being worked in the ordinary way, on account of the induced currents; but a sub-marine line is free from this source of disturbance, and Mr. Preece informs me that the Telephone has been successfully worked through 60 miles of cable: I believe between Dartmouth and Guernsey.

Professor Bell has himself explicitly stated that he has not brought forward his Telephone in its present form as a perfected instrument; but because it has reached a stage of great theoretical interest, and one not altogether destitute of practical applicability. He, and his co-adjutors in Boston, are still labouring to perfect it.

In speaking through the Telephone, we should not shout, for shouting tends to stress the diaphragm to its maximum, where its sensibility is least, and sounds may easily be lost. The great point is to combine a sufficient strength of voice with clear and deliberate utterance.

After the reading of the paper, Mr. Brough gave a practical demonstration of the working of the instrument. With the kind permission of the Surveyor General, communication had been made between the Society's Rooms and the Observatory at the Surveyor General's Office, a distance of half a mile, and the sounds of the voice, whistling and a musical box were successfully transmitted between the two points.

MR. BLOCHMANN exhibited rubbings of the following Persian inscriptions, which were received from Mr. H. James Rainey, Zamíndár of Khulná, Jessore.

## I.

"This rubbing," Mr. Rainey states, "is taken from a slate slab, which is placed on the west side of the interior of a large well, situated a short distance beyond the southern gateway of the Munger Fort, and to the south-west of the Station Racket Court, on one side of which building is a Bath, to which the well supplies water." (Metre, *short Hazaj*.)

بعهد دولت مخصوص خاني \* كه بادا تا ابد دور بقاءش  
بنا گردید نهر باغ جائے \* كه چاه باغ شد دلکش ثنائش  
زهجرت در هزار و هفتصد سال \* مرتب شد بنای دیو پایش  
چو چاه و چاه در صورت یکے بود \* فزود آن باغ را چاه بجایش  
شدش تاریخ چاه باغ در دهر \* فزون آمد ز چاه باغ هایش

1. During the time of the rule of Makhśús Khán—may it last for ever!—

2. The aqueduct of the garden was made in a way that the grandeur of the garden is his (or its) pleasing praise.

3. In the year 1007 of the Hijrah this longlasting building was erected.

4. As the words چاء 'grandeur', and چاه 'a well' have the same form, the grandeur of the garden increased by it (the well).

5. Its chronogram lies for ever in the words *cháh-i-bágh*, 'the well of the garden,' but the letter *he* in it is to be left out.

Adding up the letters of *cháh-i-bágh* and subtracting five for the *he* to be omitted, we get 1007 H., or A. D. 1598-99.

Regarding Makhsús Khán, *vide* Kín translation, Vol. I, p. 388. He is the founder of 'Makhsúsábád', the *Muxadavad* of our old maps, which name was subsequently changed to Murshidábád by the famous Murshid Qulí Khán.

## II.

"The second rubbing", Mr. Rainey writes, "is taken from a slate slab, lodged over the centre eastern door of a Mosque House, now occupied by Mr. A. V. Roberts, District Engineer (who gave me these rubbings) and owned by C. Aguilar, Esq. This house faces the Racket Court on the southern side, and is divided from it by the large public road running there east and west."

انضل الذكرا لا اله الا الله محمد رسول الله \* بناء مرزاني ولي بيگ كولابی بوقوف  
لعل معمار \* نهاده بناء مسجد يکھزار و هفتاد و چہار \*

The best praise is—'There is no God but Allah, Muhammad is Allah's prophot.'

The building of Mirzání Walí Beg of Koláb, under the direction of La'l the architect. The building of the mosque took place in 1074 [A. D. 1663-4.]

The rubbing has مرزانی *Mirzání*, instead of مرزا *Mirzá*. The Dictionaries do not give the word.

The inscription spells معمار *ma'ammár* !

Dr. RÁJENDRALÁLA MITRA exhibited a copper plate inscription lately received from Mr. W. R. Davies of Bhágalpur. The plate measures 15·5 × 7·7 inches, and has on the top a cast copper seal, six inches high. The name on the seal is that of Náráyanapála Deva, and the legend over it is the Buddhist wheel of the law, mounted on a pedestal, and supported on the two sides by two deer. Below the name is a sprig with two leaves and a flower. The inscription on the plate is in a modified form of the Kutila character, and extends to 29 lines on the front, and 25 on the reverse, side. Its language is Sanskrit, and its purport the grant of a village named Mukutika for the use of Siva Bhaṭṭáraka and his followers. The grant was made on the 9th of Vaisákha, in the 17th year of the donor's reign, when he was encamped at Mudgagiri, modern Monghyr. The document was composed by his minister Bhaṭṭa Guravo, the same who recorded the Buddal inscription noticed in the volume of the Journal of the Society, and engraved by Madghadása, son of Subhadása.

The genealogy of the donor begins with Gopála, the same whose name occurs in the Monghyr plate translated by Wilkins (*Asiatic Researches* vol. I. p. 123.) He had two sons, Dharmapála and Vákpála, who successively succeeded him. The last appears under the name of Devapála in Wilkins' plate. His sons were Devapála and Jayapála who seem to have reigned one after another. The son of the last was Vighrapála, who married Sujjá, a daughter of the Haihaya race, by whom he begat Náráyanapála. A transcript and a translation of the document will be published in the next number of the Journal.

Dr. RÁJENDRALÁLA MITRA also submitted three large bricks brought by him from one of the arches of the great Temple at Buddha Gayá. Two of them were shaped like voussoirs, having the upper side longer than the lower, and the sides curved to correspond with the curve of the arch. The upper side measured 16 inches and the lower 15 inches, the breadth being 9 inches. The third was a perfect parallelogram, 15 × 9. In presenting them he gave a short account of a tour he had recently made in the Gayá district in search of antiquities, and of his researches at Buddha Gayá. He said that at the beginning of the year the king of Burmah had deputed two persons to repair the Buddhist temple at Buddha Gayá, and these persons had for some time carried on their work, when in June the circumstance was brought to the notice of Government, and he was requested to go to Buddha Gayá, and report to Government as to what should be permitted in the way of repairs, so as not to mask or modernise the old monument. When Dr. Mitra came to the place in September last, he found the Burmese gentlemen had already cleared an area of about 250 × 230 feet around the great temple, dug out the foundations of the surrounding buildings for bricks, levelled the ground with rubbish, raising thereby the level by nearly five feet, removed the old granite pavement, reset it on the higher level, demolished the pavilion of the Buddhapaḍ, which had stood in front of the temple, built a new retaining wall to the west of the platform round the sacred Bo Tree, and enclosed the cleared area by a new wall. They had also destroyed the stucco ornaments and mouldings in the interior of the sanctuary and covered the walls with plain chunam plaster. Under the circumstances Dr. Mitra could not trace the locale of the several buildings which Hiouen-Thsang had described as standing round the temple. By a careful study of the mouldings still existing on the exterior of the temple he had prepared restored drawings of the southern and the eastern façades of the temple, and suggested to Government that the repairs may be permitted according to the drawings. The drawings were exhibited to the meeting as also a large collection of sketches of the various objects of antiquarian interest which he had met with in course of his tour. He also announced that he had collected 85 pieces of sculptured stones at Buddha

Gayá, a part of which he had suggested should be presented to the Society. Among these stones there were several pillars, rails and coping stones of the old Áśoka railing round the temple. One of the stones bore a large inscription in the Lāt character of the 3rd century, B. C., and another in the Gupta character of the fourth century A. D.

Adverting to the arches which he was the first to bring to the notice of the public, Dr. Mitra said that there were altogether eleven arches in the temple, four over doorways, two over passages leading to the sanctuaries, and five forming vaulted roofs. Seven of these were pointed Gothic, and four semicircular. They were built of well-dressed bricks, shaped like voussoirs, and set in clay cement. The bricks were set lengthwise, touching each other by the ends, and not side by side as is usual in the present day. This arrangement, conjoined with the defect in the cement, made the arches weak; but they were true radiating arches, *i. e.*, a series of blocks so formed as to fit in and disposed in the line of a curve, the blocks supporting each other by their mutual pressure, and the entire structure supported at the two ends resting on piers and not horizontal ones, formed of projecting bricks which were so common in India in former times. When Dr. Mitra first saw the arches in 1864, he had only two hours to devote to the examination of the ruins, and he then thought that they were synchronous with the shell of the temple. But further and more careful examination had now convinced him that the temple had originally been built without any arches, the opening in front having been closed by gradually projecting bricks, which left a very high triangular opening, very like what was now to be seen in the old temple at Konch. The object of this opening was to throw the sunlight at dawn on the sacred image in the temple. It was, however, found exceedingly inconvenient, as it brought in the rain-water, which deluged the sanctuary. The interior was therefore divided into three storeys, by building two vaulted roofs, and the entrances were arched over, and provided with doors. This, however, was done before the seventh century, for when the Chinese traveller Hiouen-Thsang, visited the place in 637 A. D., he found the different storeys and the pavilion in front, which stood over a vaulted roof, and described them in detail. He said they had been built after the temple (*en suite*) but did not give any date. General Cunningham accepted the opinion of the Chinese traveller, and believed that the arches had been built long before the 7th century. Concurring in this opinion, Dr. Mitra observed that the fact would inevitably lead to the conclusion that the arches had been built by the natives of India without any aid from foreigners. Had they learnt the art of building arches from the Western nations the Persians, Greeks or Romans, they would have for certain reproduced the foreign model, and arranged their bricks in the same order in which those nations did, and used the same cement which their teachers did. But they

did nothing of the kind. They arranged their bricks in the order they thought best, and that was decidedly inferior. They knew the use of surki and chunam cement, and used it extensively in forming mouldings and images, and on their roofs and copings, and had they seen it used by the Persians or Greeks in the construction of the arch, they would have followed the example; but they did not, depending entirely on the strength acquired by the shape of the bricks, and the lateral pressure of their voussoirs. One important element in an arch was the key-stone. In the foreign models this is placed in the centre of the arch; but the Hindu or Buddhist builders had apparently never seen this arrangement, and, following their own idea, placed it on a side of the centre, wherever the exigencies of their mode of building rendered it most convenient. Taking these facts into consideration Dr. Mitra was disposed to maintain the opinion which he had expressed on a former occasion that the arches were both in conception and execution purely Indian.

Mr. H. F. BLANFORD said that the question of the arch in the Budh Gayá temple had been very fully discussed at more than one meeting of the Society about 1864, and his recollection was, that it was generally agreed by competent judges, that the apparent arch in question was not structurally an arch at all: besides which, it was of much later date than the body of the building. These conclusions did not seem to be invalidated by Dr. Rájendralála Mitra's present description.

The PRESIDENT said:

The Society is indebted to Dr. Rajendralal for his luminous statement as to the arches at Budh Gayá. Whatever may be their actual age, he has at least made it clear that they are an addition to the building long subsequent to the date of the original structure.

Nor can they be, as he has demonstrated, termed true arches. It seems to me very clear that the idea which they exemplify is derived from the wells built of bricks forming a segment of a complete arch, such as are found at any Hindu ruins of an early date, such a wall round on its side would give an example of a double arch just like those of the Gayá temple. In short, the Gayá arches may be described not as arches, but as structures showing progress towards the discovery of the true arch.

Mr. H. F. BLANFORD read extracts from three letters from Mr. S. E. Peal, of Sapakati in Assam, relative to pot-holes, to the geological structure of Goalpara Hill, and to Mr. Peal's observations on the movements of the clouds in Upper Assam. The first passage was written with reference to the discussion of Dr. Feistmantel's paper on 'pot-holes,' which took place at the meetings of the Society in March and June. Mr. Peal writes,—“I see Dr. Feistmantel has been treating us to a disserta-

tion on 'pot-holes' and doubts whether your statement that they are exceedingly common, is correct. From a boy I can remember them, and was never particularly aware that any other explanation than running water, sand and gravel was necessary. Out in India, here in Assam, I find them almost the only common characteristic of the water-worn forms. I do a good deal of Rob Roy canoeing in cold seasons, up the gorges of the rivers coming from these Naga Hills, and so have ample opportunity for studying them (if necessary). On one occasion up the Tankak river, at a place where a bed of sandstone crosses and causes a fall of some 10 feet, large surfaces are exposed in the dry season; and the surface of the rock is full of pot-holes. I once caught thirteen good large turtle, each in a hole, head downwards; some wet sand and gravel at the bottom kept them from being quite dried up by the sun. Holes two and three feet deep—quite round and nearly vertical.

At another fall, I, one day, saw the spray flying back and upwards in such a peculiar manner, that I went over and examined closely, and discovered it was simply millions of small fish, 4 and 6 inches long, all trying to jump the fall, up stream, and that a tolerably large pot-hole was half full of fish, which served for the supper of our camp. \* \* \* Up the Disang F. R. Mallet and I saw some curious sections of pot-holes, in a large mass of exposed sandstone. The holes were pretty close, and of sizes from 6 inches to a couple or three feet in diameter, and from 5 to perhaps 8 or 9 feet deep. They may have been more, as they ended in deep water."

The next passages read, refer to Goalpára hill and are as follows:—"I see the Glacier question is on the tapis. I have been trying to convince Mallet that Goalpára hill is a moraine. Seeing that Goalpára hill is only about 500 feet\* above sea-level, I am afraid Mallet won't be convinced. The hill has large, angular, grey, metamorphic blocks, lying on the surface, and bedded in contorted gravel and sand; no bedded rock above on the hill." "I stayed on it for over a fortnight in 1873, and it was while watching excavations for gravel near the top, that I had my attention first roused by the extraordinary colour and curvature of the sands, embedded in layers; \* \* \* some beds of sand dark rose colour, white, yellow, brown, and even bluish grey, contorted, and having coarse gravel and small blocks of stone here and there. \* \* \* I don't know much about glaciers but the formation was so peculiar, I noted it well at the time. I found no scratched stones, but the big blocks on the hill, more or less angular and partially embedded, are hornblende,—so Mallet says, after I had sent him some pieces. Where this hornblende came from, I cannot guess. The hill is

\* It is less. The Meteorological Observatory which is on the top of the hill is 386 feet only above sea-level, and 249 feet above the highest flood level of the river.—H. F. B.



gravelly, all through seemingly; and rests on sandstones, bedded and seen on the level of the river,—and not above, as far as I can see. How these great blocks of dark grey rock got up on the hill top was the puzzle to me. They seem scattered about on its surface, top and sides; and the hill is isolated, not overhung by any higher land. \* \* \* The blocks of hornblende are probably up to 4 or 5 tons, now and then, and both isolated and grouped; quite irregular and more or less angular. They seemed to me like the blocks carried along a glacier surface. However, it may, after all, be easily soluble by some other means, and not need a large glacier to account for it. \* \* \* These gravelly hills are not common in Upper Assam, which is a dead flat; not a stone of any sort to be seen.”

Mr. BLANFORD said that the sketches of contorted and coloured sands which Mr. Peal had sent, certainly reminded one much of certain superficial deposits of the English river valleys, which were attributed to the action of ice. But he was hardly prepared to accept the idea of a great glacier filling the Assam valley, without very much stronger evidence. If the structure described be really due to ice action, it would demand a change of climate of less magnitude, to suppose that the deposits were due to river ice in winter. Perhaps a climate which admitted of glaciers in the Nága hills down to 4,500 feet, as described by Major Godwin-Austen,\* might also admit of river ice, in winter, within 500 feet of the present sea-level.

The last extract read had reference to the drift of the clouds in Upper Assam. Mr. BLANFORD said that he had suggested this class of observations to Mr. Peal, with a view to verifying the suggestion made in a paper on the Physical Explanation of the Inequality of the two semidiurnal Barometric Tides, published in the 45th volume of the Society's Journal; viz., that there was a flow of air in the day-time from over the valleys, to the mountains on either side, and a return flow at night. Mr. Peal writes—“About winds, I can tell you that I have pretty steadily had my eye on the clouds, upper and lower, since your last, and am still more struck than ever, with the remarkable regularity of the flow and counter-flow. The night winds (if any) travel steadily and slowly from the SSW. or WSW. (within three points) and do not change till 9 or 9½ A. M. when a counter-current sets in from the very opposite point, say NE. to NNE. This continues more or less all day, as a surface and upper wind, but I can see no trace of a wind to or from the hills, and never remember to have noticed such a wind, except in squalls, and I am pretty near a good mass of hills that should shew any thing of the kind. Our worst squalls are from the NW. \* \* \* As the cold season comes on, I find the NE. wind begins earlier. It is, at times, now seen at 8 A. M. but *seen* above and not *felt* below where all is still and under a dense fog. As the sun rises, the latter dissi-

\* Journ. As. Soc. Bengal, Vol. xlv, Part 2, p. 209.

pates; but not till say half-past 9, does the air below move, so as to be felt as a light breeze, which freshens till say 11 A. M. and remains till 2 P. M. when it dies off slowly, and all is still, till the light evening or night airs again set in from SW. to WSW., the two winds being hardly from opposite points; they are more like this [sketch showing the directions to be NNE. and WSW.]. I will keep this question of the winds in view as the season goes on, and, ere done with it, may mention, that in arranging houses, such as lines, godowns, &c., we generally place them so as not to be in the NE., SW. direction more than we need or are obliged to.”

On the above passage Mr. BLANFORD remarked “Mr. Peal’s observations then, do not confirm the idea of a diurnal interchange of the upper strata of air between the mountains and the valley, but they show a very decided movement towards the sea in the day time, with the reverse at night; such had been indicated in the case of Calcutta in the discussion of the anemometric records;” and, as regards the higher cloud-bearing strata, had been established by frequent observations on the movement of the clouds over the same place. That such a movement takes place, as a general law, had been indicated, on theoretical grounds, in the paper above referred to, and, in a subsequent paper read before the Society at the meeting in March last, it had been adduced in explanation of the alternation of land and sea breezes on coast lines. It was nevertheless extremely interesting to find that this diurnal oscillation of the winds was so regular and well marked, far up in the interior, viz., in Upper Assam. Of course so general a movement must, in a great measure, mask any mere local movement, such as that between valleys and mountains; (supposing the latter to exist). Within the last few days, another very interesting observation on this out-flow of the atmosphere from the land to the sea, above the diurnal sea-breeze, had been made in a balloon ascent at Bombay, by Mr. Simmons Lynn; an account of which has appeared in the newspapers. On ascending at Bombay at 4h 40m. in the afternoon the balloon was first carried by the sea-breeze to the S. East, but having attained an elevation of 5000 feet was carried off by the upper current slowly to N. W. This observation is of great interest as assigning a datum for the vertical thickness of the sea-breeze current.†

\* Indian Meteorological Memoirs, Vol. I, p. 12.

† The following is the account of the aeronaut published in the ‘Englishman’ of the 30th November, extracted from the ‘Times of India.’ In two minutes from the time of starting, (at Lál Bâgh gardens on the Parell Road, Bombay) I found myself at an altitude of 3000 feet. I proceeded at this elevation in a course S. E. by S. about 6 minutes, and determined, if possible, to continue in this direction across to the opposite shore, but I was doomed to disappointment. When I had reached about one-third across the surface of water in the line above given, the gas rapidly expanded and fully

MR. H. B. MEDLICOTT said he scarcely liked to bring forward only current observations of his own as against the more deliberate observation of another; but, as the point at issue was of such importance he would not withhold the suggestion he had to make. On his way to Upper Assam in 1865, he stopped a few hours at Goalpára and made some notes upon the little hills upon which the station is built. He then had a first opportunity of observing to how great a depth and how completely the gneissic rocks become decomposed, even on steep hill sides, when protected from denuding action by very dense vegetation. The resulting clay might readily be taken for a deposit; and the undecomposed harder spheroidal masses of granitoid gneiss, that often remain quite unaffected, have all the appearance of boulders. But he particularly recollected puzzling for some minutes over what seemed a contorted layer in the clay. He had, however, to conclude that it was the remains of a string of quartz in contorted schist, all the rest having become reduced to earth. It was in fact this observation that convinced him of the true nature of the clay covering these low hills.

He did not pretend to say that Mr. Peal's observation and his own referred to the same features, but the possibility of its being so was sufficient excuse for recording his note.

Owing to the lateness of the hour the papers could not be read, but with the consent of the meeting the following were taken as read.

1. *Memorandum of the diurnal Variation of atmospheric Pressure at the Sandheads*, by CHAS. HARDING, ESQ., with a prefatory note by HENRY F. BLANFORD, *Meteorological Reporter to the Government of India*.

This paper will be published in the Journal, Part II.

2. *Catalogue of the recorded Cyclones in the Bay of Bengal up to the end of 1876*, compiled by HENRY F. BLANFORD, ESQ., *Meteorological Reporter to the Government of India*.

This paper will be published in the Journal, Part II.

distended the flaccid portion of the balloon. This caused her to ascend very rapidly to an altitude of 7,500 feet, but I found that my course was reversed to NW, and I was leaving Bombay at a considerable speed towards the Arabian Sea. \* \* \* I discharged a sufficient quantity of gas to descend to an elevation of 5000 feet. Then I found myself exactly balanced, with the car in one atmosphere and most of the sphere of the balloon in another. The balloon at this moment ceased to revolve on its vertical axis, one side, that towards the East, being very cold, and that towards the West much warmer. I now descended to an elevation of 4000 feet, and proceeded in a northerly [sic] course, but just by way of experiment I re-ascended to 5000 feet and found that the balloon was again making for sea in a North-Westerly course, exactly at the same altitude as before. \* \* \* I continued the descent and found I was proceeding very slowly in the same course as at first."

3. *Contributions to the Geography and History of Bengal. No. IV.—By*  
H. BLOCHMANN, M. A.

(Abstract.)

The essay notices the following points :—

(a.) *Inscriptions.* The Society has received from Maulawí Sayyid Iláhí Bakhsh Sáhíb, of Máldah, rubbings of nine new inscriptions from Gaur, of which the most important are—(1) An inscription of 647 H. (A. D. 1249) of Jalál-uddín Mas'úd Jání, governor of Bengal. This is the oldest Muhammadan inscription hitherto discovered in Bengal. (2) An inscription of Yúsuif Sháh, of 884 H. (A. D. 1479), ranking in beauty after the Adínah Mosque inscription. (3) A Mahmúd Sháhí inscription of 943 H. (A. D. 1536), from which we see that Mahmúd Sháh's nickname was *Badr-i-Sháhí*, which explains the occurrence of this name on Mahmúd Sháh's coinage.

Maulawí Sayyid Iláhí Bakhsh Sáhíb has also written in Persian a historical work, entitled 'Khurshed-i-Jahán-numá', containing a description of Gaur and Máldah, of which an English translation will be given.

The best thanks of the Society are due to the Maulawí Sáhíb for his disinterestedness in placing his materials at the service of the Society.

(b.) *Coins.* Three new coins have been received for description from Mr. W. Campbell, Jalpáigori, viz., one struck by Fath Sháh in 887 H. (A. D. 1482), and the other two by Husain Sháh. Figures of the coins will be given. The latter coins have enabled me to solve the puzzling legend\* on many of Husain Sháh's coins. The king describes himself on them as the conqueror of Kámrú, Kántah, Jáj Nagar, and Asám, just as the Madrasah inscription of Gaur, discovered by Mr. Westmacott (Journal, As. Society, Bengal, Pt. I, for 1874, p. 303) describes Husain Sháh as the conqueror of Kámrú and Kántah.

(c.) *Chronology.* The chronology of Bengal history, which may now be said to rest on a secure basis, is curiously verified in several points by Chinese historical works. M. Pauthier, in his "Examen Methodique des faits qui concernent le Thian-tehu ou l'Inde, published in 1839, mentions that Aïya-sse-ting of Pang-ko-la, i. e., Ghiyás-uddín (A'zam Sháh) of Bengal, sent several embassies to China, which the Chinese returned. The last return embassy arrived in Bengal in the tenth year of the Chinese cycle called *young-lo*, and assisted at Ghiyás-uddín's funeral. According to Prinsep's tables, the tenth year of the cycle *young-lo*, would correspond to 1395 A. D., or 799 H., and this is the last year found by Mr. E. Thomas on A'zam Sháh's coinage. Another Chinese embassy arrived in Bengal in the 13th year of

\* *Vide* Journal, As. Socy. Bengal, 1873, Pt. I, p. 292, note.

the same cycle, when *Sai-fe-ting* is mentioned as the reigning monarch. This would be 1398 A. D., or 801-2 H., when, according to the testimony of a coin in the Society's cabinet, *Saif-uddin* Hamzah Sháh, was king of Bengal.

It is to be hoped that further researches in Chinese history will add to our knowledge of Bengal history.

Regarding Rájá Káns Náráyan of Táhírpúr, after whom the district of Rájsháhí is named, additional information has been obtained. Dr. Rájendralála Mitra succeeded in obtaining a copy of the genealogical tree of the Rájás of Táhírpúr, which shews that Rájá Káns was the grandson of Rájá Bijaya Lashkar. Just as some of the Mahárájás of Jaipúr received the title of 'Sawái', or one and one-fourth, to indicate that each was more than *one* man, so does the title of 'Lashkar' signify that the holder was considered in value equal to an army. It is also worth noticing that a large parganah in Rájsháhí has the name of Lashkar. Rájá Káns's grandfather, therefore, must have been a commander of distinction.

The above mentioned Chinese annals do not give Rájá Káns's name; the embassies were only renewed twenty-three years later, during the reign of Muhammad Sháh, Rájá Káns's son.

4. *On the Bharrs of Bundelkhand, with an account of an Inscription in Páli characters.*—By VINCENT A. SMITH, B.A., C.S.

THE PRESIDENT said that as the evening was far advanced, he would not ask the Secretary to read the paper. The essay, with a few omissions, would be published in the Journal (No. III, for 1877). He would, however, exhibit the Páli copper-plate, which accompanied the paper, and ask Dr. Rájendralála Mitra to offer some remarks on the plate, which was a clear forgery.

DR. MITRA observed that the inscription was remarkable in many respects. It was the only document in the ancient Lát character, which bore so recent a date as Samvat 1404. It was, likewise, the only record of a purely historical character which had been found engraved on a metal plate. It afforded, moreover, the only instance in which the Lát character had been used to record a document in the Sanskrit language. The purport of it was a long protracted war which had been carried on on the banks of the Virabhadrá river between the Bharrs and the Lodhis, the former headed by one Kanja, and the latter by Sankara. The war terminated in the overthrow of the Bharrs, when the images of the Bharrs were carved in stone, and those of the Lodhis made in alto-relievo, and left on the battle field. The document was inscribed, says the writer, on a bell-metal plate in Páli character by the priest of the Bharrs in compliance with the order of the Lodhí king. Now, the facts which make the record most important are just such as are calculated to excite doubts about its authenticity. Both the Bharrs

and the Lodhís were perfectly unlettered, very primitive people, and it is difficult to conceive that they should have retained a thorough knowledge of the Lát character when every body else in all India had for centuries entirely forgotten it. That a conqueror should wish to perpetuate the memory of a successful war was but natural; but one would suppose that in such a case he would employ a person of his own side to write it down, and not employ the priest of his enemies. Nor is there any evidence to show that such a record was ever ordered by any mediæval Hindú or aboriginal king to be inscribed on a small metal plate. Such a plate could be seen by nobody, and would be lost in no time. A large stone, or the scarp of a rock, would be the proper receptacle for it; but it was not thought of. The character, too, in such a case would be that which was best known, and not what was quite unintelligible to the people of the country. How the writer came to know that Páli was the name of the character, it is also difficult to conceive. Prinsep, when he first discovered the key to the alphabet called it Lát, because it occurred in its fullest extent on the Lát inscriptions of Aśoka. Subsequently, when it was found that the language of the records bore a strong resemblance to the Páli of Ceylon some people called it Páli; but the true Páli character as still extant in Ceylon and Burmah is quite different, and the name is a misleading and incorrect one. How did the Lodhís commit the mistake? The word Páli in their day would have applied to the Sinhalese Páli; and not to the character of the Lát. Supposing that the Lát character was called Páli in their time, why in selecting it the Páli language was not also selected? Again, had the so-called Páli, *i. e.*, the Lát character, been then well known, why were not the Páli numerals also used? The writer evidently knew them not, and therefore employed the modern Sanskrit figures slightly mystified by putting an extra scroll or two here and there? Further, the material of the record is called Káusa or "bell-metal," and that metal is held by the Hindus to be impure, and never used for ceremonial purposes. In the Sástras copper is the metal commended for sásanas; brass is occasionally used, but never the káusa. The speaker could not make out whether the plate was of bell-metal or brass; but he thought it looked very like the latter. It was besides a rolled plate, not a hammered or cast one, and bell-metal, being brittle, can neither be hammered nor rolled into plates. Taking it to be brass, it should be remembered that laminating rollers were perfectly unknown in India four hundred years ago, and even now are known only by name from the circumstances of rolled plates being brought out from England for sale in this country, and from some rollers being used in the Government mints. No one in India uses rollers for laminating brass. And this fact was alone sufficient to show that the plate was a forgery. A piece of rolled brass of the size of the plate was not worth more than four annas, and punching the letters on it would not cost much

more, and such a record could be easily prepared. Dr. Mitra was of opinion that some one who had got hold of a copy of Prinsep's plate of the Lát alphabet, had got up the record to impose upon Mr. Smith. In Prinsep's time the Páli numerals had not been discovered. It was only the other day that General Cunningham discovered only a few, and as this was not known to the forger, he was driven to the necessity of using the Sanskrit figures slightly altered. It seemed, too, that the man knew nothing of the Bharrs until he saw the name in English letters. In Sanskrit and Hindí the word is, and should be, written with the  $\text{ॐ}$  with a dot under it, to mark its peculiar sound. In English this cannot be reproduced, and the usual practice is, to write the word with two *rs* at the end. In Sanskrit this double *r* is never permitted; but, having seen it in English with a double *r*, the writer at once copied it in the Páli character, and in a Sanskrit document. He had to prove his statement before an Englishman, and, apprehending lest the use of the dotted  $\text{ॐ}$  should lead to doubts, he sacrificed Sanskrit grammar, and the usage of the country. It might be asked what would be the object of such a piece of imposition? But from the days of Wilford there have been so many attempts of the kind made by Pandits, that it is scarcely necessary to dwell upon it at length. The smile of a Sahib of high rank and the rewards expected are quite sufficient to account for such wicked acts.

The PRESIDENT said after the very clear statement made by Dr. Rajendra Lal, for which the Society was much indebted to him, there could be no doubt that the bronze plate in question was an impudent forgery. It was almost superfluous to multiply proofs in addition to those brought forward, but at least it was fair to ask why, if the ancient character was preserved the ancient numerals were not preserved also, and why with the characters of 250 B. C. were associated not the numerals of that date but the numerals of to-day?

Again the transliteration gave, not perhaps good Sanskrit, but at least intelligible sense, certain errors being overlooked. Still it seemed to the President very difficult to get the transliteration somewhat differently from the text of the plate; the very first letter of the first line might possibly be read as "go", but it was more like "ta." Moreover, unless the writer was very unversed in the character he used, the "dhavya" in the third line would surely have the vowel mark attached to the "y" rather than to the first letter of the compound, and the President thought that a scribe of Asoka's date would have written the "marhavirrya" of the transliteration.

Without going further, it seemed only too probable that the plate was produced from the transliteration, and not the transliteration from the plate, and that Mr. Vincent Smith had unfortunately stumbled upon a Hindu "Simonides."

The reading of the following paper was postponed—

Pali Studies, No. 2. Vuttodaya. By Major G. E. FRYER, Deputy Commissioner, British Burma.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in November last.

TRANSACTIONS, PROCEEDINGS, AND JOURNALS,  
presented by the respective Societies or Editors.

Berlin. Die Königliche Preussische Akademie der Wissenschaften,—Monatsbericht, Juni, Juli, 1877.

Juni. *Siemens*.—Über die Abhängigkeit der elektrischen Leitungsfähigkeit des Selens von Wärme und Licht. *Peters*.—Herpetologische Notizen.

Bombay. The Indian Antiquary,—Vol. 6, No. 73.

*Dr. Muir*.—On the question whether Polyandry ever existed in Northern Hindustan.

Calcutta. The Geological Survey of India,—Records, Vol. X, Pt. 3, 1877.

*Dr. Feistmantel*.—Notes on Fossil Floras in India. *W. Theobald*.—On the occurrence of Erratics in the Potwar, and the deductions that may be drawn therefrom. *F. R. Mallet*.—Limestones in the neighbourhood of Barákar.

———. The Mahabharat,—Vol. 3, No. 15.

———. The Rig Veda Sanhita,—Vol. 1, No. 3.

Cambridge, U. S. The Museum of Comparative Zoology at Havard Collage,—Bulletin, Vol. 3, Nos. 11—16.

———. Memoirs,—Vol. 2, Nos. 9, 10.

London. The Athenæum,—Nos. 2607—2611, 1877.

———. The Geographical Magazine,—Vol. 4, No. 10.

———. The Geological Society,—Quarterly Journal, Vol. 33, No. 131.

———. Nature,—Vol. 17, Nos. 415—419, 1877.

———. The Royal Asiatic Society,—Journal, Vol. 9, Pt. 2, July, 1877.

*E. Thomas*.—The Early Faith of Asoka. *H. H. Howorth*.—The Northern Frontagers of China, Pt. 2. The Manchus. The Northern Frontagers of China, Pt. 4. The Kin or Golden Tatars. *M. H. Sauvaire*.—On a Treatise on Weights and Measures, by Eliyá Archbishop of Nisibin. *Sir T. E. Colebrooke*.—On Imperial and other Titles. *Capt. C. J. F. Forbes*.—Affinities of the Dialects of the Chepang and Kusundah Tribes of Nipál, with those of the Hill Tribes of Arracan. *A. H. Schindler*.—Notes on some Antiquities found in a Mound near Damghan.

———. The Zoological Society,—Proceedings, Pt. 2, 1877.

*Lieut.-Col. R. Beddome*.—Descriptions of three new Snakes of the Family *Uropeltida* from Southern India. *Mr. Selater*.—Remarks upon a two-horned Rhinoceros killed in 1876 near Comillah, in Tipperah, and on a living specimen of *Rhinoceros Sondaicus*, from the Sunderbans. *C. G. Danford*.—On the Mammals of Asia Minor. *Arthur, Marquis of Tweeddale*.—Descriptions of three new Species of Birds from the Indian Region.

———. Transactions,—Vol. 10, Pt. 2.



Palermo. Società degli Spectroscopisti Italiani,—*Memorie*. Dispensa 9, Settembre, 1877.

Notizei di Calcutta. Lettera del P. Lafont al Prof. Tacchini. Riassunto delle protuberanze solari e della macchia osservata alla Specola del Collegio Romano nel giugno 1877. Macchie solari osservate a Palermo nei mesi di luglio agosto e settembre 1877, da P. Tacchini e G. de Lisa.

Paris. La Société de Géographie,—*Bulletin*, Septembre, 1877.

Dr. J. Harmand.—Notes sur les provinces du bassin méridional du Se Moun (Laos et Cambodge siamois).

Schaffhausen. Die Schweizerische Entomologische Gesellschaft,—*Mittheilungen*. Vol. 4, Heft Nro. 10; Vol. 5, Heft Nro. 1-2.

Washington. The United States Geological and Geographical Survey of the Territories,—*Bulletin*, Vol. 2, No. 4; Vol. 3, Nos. 1—3.

———. The United States Entomological Commission,—*Bulletin*. Nos. 1, and 2.

Yokohama. The Asiatic Society of Japan,—*Transactions*, Vol. 5, Pts. 1-2.

Pt. 2. J. H. Longford.—A Summary of the Japanese Penal Codes.

## BOOKS AND PAMPHLETS,

*presented by the Authors.*

ANDERSON, A. Corrections of and addition to the "Raptorial Birds of North-Western India," Pts. 1 and 2. Pamphlet.

CHAMBERS, C. and F. On the Mathematical Expression of Observations of Complex Periodical Phenomena; and on Planetary Influence on the Earth's Magnetism. Pamphlet.

CHAMBERS, C. The Absolute Direction and Intensity of the Earth's Magnetic Force at Bombay, and its Secular and Annual Variations. Pamphlet.

HAYDEN, F. V. Explorations made under the direction of, in 1876. Pamphlet.

———. Catalogue of the Publications of the U. S. Geological and Geographical Survey of the Territories, 2nd Ed. Pamphlet.

———. The Grotto Geyser of the Yellowstone National Park, with a descriptive note and Maps, and an illustration by the Albert-type process.

———. Sixth Annual Report of the U. S. Geological Survey of the Territories, embracing portions of Montana, Idaho, Wyoming, and Utah; being a report of progress of the Explorations for 1872. 8vo., Washington, 1873.

———. Preliminary Report of the U. S. Geological Survey of Wyoming, and portions of contiguous Territories. 8vo., Washington, 1871.

MCCRADY, J. Gymnophthalmata of Charleston Harbor. Pamphlet.

———. Description of Oceania (*Turritopsis*) Nutricula, N. S. and the

Embryological history of a singular Medusan Larva found in the Cavity of its Bell.

PRATAP NARAIN SINGH. *Isvara Tatva*. A Treatise on Nyaya Philosophy. Pamphlet.

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# I N D E X

TO

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FOR 1877.

|                                                                                                 | Page         |
|-------------------------------------------------------------------------------------------------|--------------|
| 'Abdul-Wási', of Hânsí, ... ..                                                                  | 121          |
| <i>Abornis flavogularis</i> , ... ..                                                            | 102          |
| Accounts, abstracts of, ... ..                                                                  | appendix, xv |
| <i>Actinura Oglei</i> , ... ..                                                                  | 102          |
| Aín-i-Akbarí, ... ..                                                                            | 36           |
| Aira, author of Hâthigumphá Inscription, ... ..                                                 | 165          |
| Aitareya Aranyaká, completion of ... ..                                                         | 35, 36       |
| Akbarnámah, ... ..                                                                              | 36           |
| 'Alá-uddín Khiljí, repaired fortifications of Hânsí, ... ..                                     | 117          |
| <i>Alcippe Tickelli</i> , ... ..                                                                | 147          |
| Andamanese language, ... ..                                                                     | 217          |
| Anderson, (J., Dr.) description of new species of Asiatic Shrews<br>in the Indian Museum ... .. | 168          |
| "    "    elected Member of Council ... ..                                                      | 46           |
| "    "    exhibition of, and remarks on, a Bamboo-rat, ... ..                                   | 148          |
| "    "    note on the Floral simulation of <i>Gongylus</i><br><i>gongylodes</i> , Linn. ... ..  | 193          |
| Annual Meeting of the Society, ... ..                                                           | 25           |
| "    Report for 1876, ... ..                                                                    | ib.          |
| <i>Antelope cervicapra</i> , ... ..                                                             | 171          |
| Aráman, site of Hiçár Fírúzah, ... ..                                                           | 92           |
| Arches in the temple of Buddhá Gayá, ... ..                                                     | 259          |
| <i>Arctomys Himalayanus</i> , ... ..                                                            | 188          |
| Asmand, a place near Samargand, ... ..                                                          | 122          |
| Arnold, (H. K. W., Mr.), elected an Ordinary Member, ... ..                                     | 132          |
| Arracan, languages of, ... ..                                                                   | 206          |
| Asghar 'Alí Khán Diler-jang Bahádúr, Nawáb, elected an Ordinary<br>Member, ... ..               | 156          |
| Así, old name of Hânsí, ... ..                                                                  | 117          |

|                                                                                                                                                                                                          | Page   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Assám, drift of clouds in ... ..                                                                                                                                                                         | 262    |
| „ languages of, ... ..                                                                                                                                                                                   | 12     |
| Assistant Secretary, grant of pay to from Cons. Sans. MSS. fund,...                                                                                                                                      | 41, 42 |
| <i>Axis porcinus</i> , ... ..                                                                                                                                                                            | 171    |
| A'zamgarh District, inscriptions from, ... ..                                                                                                                                                            | 99     |
| <i>Bacillus hispidulus</i> , var., ... ..                                                                                                                                                                | 163    |
| „ <i>Souchongia</i> , ... ..                                                                                                                                                                             | ib.    |
| <i>Bacteria acanthopus</i> , ... ..                                                                                                                                                                      | 161    |
| Bairigaza, modern Broach, Murrhian cups exported from ...                                                                                                                                                | 160    |
| Bála Sástri, Prof., to receive Notices of Sans. MSS. ...                                                                                                                                                 | 44     |
| Ball, (V., Mr.) notes on certain Mammals occurring in the Basin<br>of the Mahánadí, ... ..                                                                                                               | 168    |
| „ „ on pottery from Balúchistán, ... ..                                                                                                                                                                  | 159    |
| „ „ remarks on cruciform monoliths ... ..                                                                                                                                                                | 190    |
| „ „ remarks on the abstract and discussion of Dr. O.<br>Feistmantel's paper, entitled "Giant-Kettles<br>(pot-holes) caused by Water-action in Streams<br>in the Rájmahal Hills and Barákar district,"... | 140    |
| Balúchistán, Ancient Pottery &c. from, ... ..                                                                                                                                                            | 157    |
| Bamboo rat from Burma, ... ..                                                                                                                                                                            | 149    |
| Banarji, Chandra Sekhara, Babu. The Kaimúr Range, ... ..                                                                                                                                                 | 76     |
| Banerjea, Rangalál (Bábu), note on a Copper-plate Grant from the<br>Cutlack Collectorate, ... ..                                                                                                         | 124    |
| Barometric Tides, variation of, ... ..                                                                                                                                                                   | 75     |
| Bayley, (E. C., Sir), elected President and Member of the Council,<br>„ „ exhibition of, and remarks on, some silver coins<br>from the Persian Gulf, ... ..                                              | 45     |
| „ „ remarks on the arches of Buddha Gayá, ... ..                                                                                                                                                         | 2      |
| „ „ remarks on the arches of Buddha Gayá, ... ..                                                                                                                                                         | 260    |
| Bears, Asiatic, ... ..                                                                                                                                                                                   | 204    |
| Beaufort, (F., Mr.), to receive Society's publications free, ...                                                                                                                                         | 41     |
| Bhagabati Churn Mallik, Bábu, withdrawal of, ... ..                                                                                                                                                      | 92     |
| Bhágalspur, copper-plate inscription from, ... ..                                                                                                                                                        | 257    |
| Bhaini, near Hánsí, ... ..                                                                                                                                                                               | 121    |
| Bhámati, ... ..                                                                                                                                                                                          | 36     |
| Bhars of Bundelkhand, ... ..                                                                                                                                                                             | 266    |
| Bhatta Guravo, composer of copper-plate inscription from Bhágalspur                                                                                                                                      | 257    |
| Bhava Gupta, of Magadha, Suzerain of Orissa, ... ..                                                                                                                                                      | 125    |
| Bibliotheca Indica, report on progress of, ... ..                                                                                                                                                        | 34     |
| Birds, new, from Assam, ... ..                                                                                                                                                                           | 101    |
| Blanford, (H. F., Mr.), catalogue of the recorded cyclones in the<br>Bay of Bengal up to the end of 1876.<br>(Title only), ... ..                                                                        | 264    |

|                                                                                                                                                                                                    |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Blanford, (H. F., Mr.), note on the variation of the Barometric<br>Tides in connection with diurnal Land<br>and Sea breezes, ... ..                                                                | 75  |
| " " on the arches of Buddha Gaya, ...                                                                                                                                                              | 260 |
| " " prefatory note to Memorandum of the<br>diurnal variation of atmospheric pressure<br>at the Sandheads, by C. Harding, Esq.,<br>(Title only), ... ..                                             | 264 |
| " " remarks on Dr. Feistmantel's paper, on<br>Giant-kettles, &c., ... ..                                                                                                                           | 77  |
| " " remarks on Himálayan Glaciation, ...                                                                                                                                                           | 3   |
| " " remarks on Mr. Whitty's paper on death<br>by Lightning in a Mine, ... ..                                                                                                                       | 103 |
| " " remarks on Pot-holes, ... ..                                                                                                                                                                   | 144 |
| " " remarks on three letters from Mr. Peal,<br>relative to pot-holes, the geological struc-<br>ture of Goalpara Hill, and observations<br>on the movements of the clouds in Upper<br>Assam, ... .. | 260 |
| Blanford, (W. T., Mr.), appointed Member of the Finance Com-<br>mittee, ... ..                                                                                                                     | 133 |
| " " description of <i>Ruticilla schisticeps</i> , (Title<br>only), ... ..                                                                                                                          | 76  |
| " " elected Vice-President and Member of the<br>Council, ... ..                                                                                                                                    | 45  |
| " " notes on some recent researches by Prof.<br>Jeitteles, of Vienna, on the origin of the<br>domestic dog, ... ..                                                                                 | 114 |
| " " note on two species of Asiatic Bears, the<br>Mamh of Baluchistan and <i>Ursus pruino-</i><br><i>sus</i> , Blyth, of Tibet, and on an appa-<br>rently undescribed Fox from Baluchistan,         | 204 |
| " " on an apparently new Hare and some other<br>Mammalia from Gilgit, ... ..                                                                                                                       | 205 |
| " " on an apparently undescribed Weasel from<br>Yarkand, ....                                                                                                                                      | 148 |
| " " on Ancient Pottery from Balúchistán, ...                                                                                                                                                       | 157 |
| " " on Colonel Miles' paper on the Route be-<br>tween Sohár and el-Bereymi, &c., ...                                                                                                               | 125 |
| " " on the Metád Rat, with a note on <i>Golunda</i><br><i>Ellioti</i> , ....                                                                                                                       | 168 |
| " " on the occurrence of wild rhinoceros in the<br>Máhanadí country, ... ..                                                                                                                        | 172 |



|                                                                                                                                          | Page    |
|------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Blanford, (W. T., Mr.), remarks on Cruciform Monoliths, ...                                                                              | 190     |
| „ „ remarks on <i>Gongylus gongylodes</i> , Linn. ...                                                                                    | 195     |
| „ „ remarks on Mammalian Fauna of the Ward-<br>wán and Upper Chenáb Valleys, ...                                                         | 188     |
| „ „ remarks on <i>Pellorneum Tickelli</i> , ...                                                                                          | 148     |
| „ „ remarks on Pot-holes, ...                                                                                                            | 145     |
| Blochmann, (H., Mr.), contributions to the Geography and History<br>of Bengal, No. IV. (abstract), ...                                   | 265     |
| „ „ exhibition of Arabic and Persian Inscriptions<br>from Hiçár Fírúzah, Hánsí and the district<br>of A'zamgarh, ...                     | 92      |
| „ „ exhibition of a rupee of Muhammad 'Adil<br>Sháh, ...                                                                                 | 156     |
| „ „ on Arabic and Persian Inscriptions from<br>Hánsí, ...                                                                                | 117     |
| „ „ on inscriptions received through Mr. H. James<br>Raine from Munger, ...                                                              | 256     |
| „ „ on the Zatt, or Gypsies, in Arabia, ...                                                                                              | 125     |
| Borneo, languages of, ...                                                                                                                | 227     |
| Bourdillon, (J. A., Mr.), elected an Ordinary Member, ...                                                                                | 113     |
| Bressa Prize, circular regarding, ...                                                                                                    | 51      |
| Brough, (R. S., Mr.), a theoretical deduction of the best Resistance<br>of a Telegraph Receiving Instrument, ...                         | 184     |
| „ „ note on Professor Graham Bell's Telephone, ...                                                                                       | 252     |
| „ „ on a case of Lightning; with an Evolution of<br>the potential and quantity of the discharge<br>in Absolute Measure, ...              | 56      |
| „ „ on the Diameter of the Wire to be employed in<br>winding an Electro-magnet in order to pro-<br>duce the Maximum Magnetic Effect, ... | 134     |
| Bruce, (W. Duff, Mr.), withdrawal of, ...                                                                                                | 182     |
| Buddha Gayá, Dr. Rájendralála Mitra's researches, at ...                                                                                 | 258     |
| Buddinath Bysack, Babu, Cashier, retirement of, ...                                                                                      | 43      |
| Bugis, (Celebes), language of, ...                                                                                                       | 219     |
| Burial-place, pre-historic, in the Nizám's Dominions, ...                                                                                | 189     |
| Burma, languages of, ...                                                                                                                 | 209     |
| Bye-Laws, rider to Rule 64, ...                                                                                                          | 68, 114 |
| Cambodia, languages of, ...                                                                                                              | 213     |
| Campbell, (J. F., Mr.), on Himalayan Glaciation, ...                                                                                     | 2       |
| <i>Canis anthus</i> , ...                                                                                                                | 116     |
| „ <i>aureus</i> , ...                                                                                                                    | 115     |

|                                                                                        | Page   |
|----------------------------------------------------------------------------------------|--------|
| <i>Canis famelicus</i> , ...                                                           | 205    |
| „ <i>familiaris palustris</i> , ...                                                    | 115    |
| „ <i>laniger</i> , ...                                                                 | 116    |
| „ <i>leucopus</i> , ...                                                                | 188    |
| „ <i>lupaster</i> , ...                                                                | 116    |
| „ <i>lupus</i> , ...                                                                   | 115    |
| „ <i>pallipes</i> , ...                                                                | ib.    |
| „ ( <i>vulpes</i> ) <i>montanus</i> , ...                                              | 188    |
| <i>Capra Sibirica</i> , ...                                                            | ib.    |
| Catalogue of Society's Sanskrit MSS., ...                                              | 183    |
| Cayley, (H., Dr.), remarks on Himalayan Glaciation, ...                                | 4      |
| Celebes, languages of, ...                                                             | 228    |
| <i>Cervus Cashmerianus</i> , ...                                                       | 188    |
| Chandra, village in Cuttack, grant relating to, ...                                    | 124    |
| Chandel Dynasty, Copper-plate grants of the, ...                                       | 192    |
| Charairongba, ruler of Manipur, ...                                                    | 101    |
| Chaturvarga Chintámani, ...                                                            | 35, 36 |
| Chiroptera from India and Burma, ...                                                   | 204    |
| Chittagong Hill-tracts, languages of ...                                               | 15     |
| <i>Chleuasicus atrosuperciliaris</i> , ...                                             | 102    |
| „ <i>ruficeps</i> , Blyth, var. <i>atrosuperciliaris</i> , ...                         | 147    |
| Clarke, (H. W., Captain), elected an Ordinary Member, ...                              | 202    |
| Clouds, movements of the, in Upper Assam, ...                                          | 262    |
| Cochin China, languages of, ...                                                        | 215    |
| Coin Cabinet, Report on, ...                                                           | 33     |
| „ Committee, election of, ...                                                          | 70     |
| Coins copper, from Sadátmand, Balúchistán, ...                                         | 158    |
| „ „ from Sarnáth, Banaras, and the Panjab, ...                                         | 91     |
| „ from Mr. W. Campbell of Jalpáigori, ...                                              | 265    |
| „ Partho-Persian, from Persian Gulf, ...                                               | 2      |
| „ rupee, of Muhammad 'Adil Sháh, ...                                                   | 156    |
| Colvin, (B. W., the Hon'ble), elected an Ordinary Member, ...                          | 68     |
| Committees, election of, ...                                                           | ib.    |
| Copper-plate from Pándukesvar, ...                                                     | 71     |
| „ grant from Cuttack, ...                                                              | 124    |
| „ grants of the Chandel Dynasty, ...                                                   | 192    |
| Council, abstract of the Proceedings of during 1876, ...                               | 39     |
| „ election of the, ...                                                                 | 45     |
| „ memorandum by regarding erection of railing, ...                                     | 250    |
| „ order sanctioning publication of the late Mr. Atkinson's<br><i>Lepidoptera</i> , ... | 134    |

|                                                                                                                 | <i>Page</i> |
|-----------------------------------------------------------------------------------------------------------------|-------------|
| Council, order sanctioning appointment of a special assistant for<br>compilation of the Library Catalogue,...   | 134         |
| "    order that only two MSS. should be lent out at a time,...                                                  | 133         |
| Croft, (A. W., Mr.), re-elected an Ordinary Member, ...                                                         | 132         |
| Crooke, (W., Mr.), elected an Ordinary Member, ...                                                              | 46          |
| Cruciform monoliths, ...                                                                                        | 189         |
| Crustacea, fresh-water, from Tenasserim,...                                                                     | 102         |
| Cup-marks on rocks in Kumaon, ...                                                                               | 54          |
| Cust, (R. N., Mr.), on the Languages of the Indo-Chinese Peninsula<br>and the Indian Archipelago, ...           | 205         |
| "    "    on the Non-Aryan Languages of India, ...                                                              | 6           |
| Cuttack, copper-plate grant from ...                                                                            | 124         |
| Cyclones in the Bay of Bengal, ...                                                                              | 264         |
| <i>Cynops chinensis</i> , ...                                                                                   | 53          |
| <i>Cynopterus marginatus</i> , ...                                                                              | 204         |
| Damant, (G. H., Mr.), note on the old Manipuri Character, ...                                                   | 101         |
| Dámba Koh, (Balúchistán) pottery from, ...                                                                      | 157         |
| Datta, Jogesh Chandra (Bábu), copper coins presented by, ...                                                    | 91          |
| Datta, Kedaranátha (Bábu), elected an Ordinary Member, ...                                                      | 202         |
| Dáúd Khán, conqueror of Palámau and founder of the town of<br>Dáúdnagar, ...                                    | 93          |
| Daukes, (F. C., Mr.), withdrawal of, ...                                                                        | 68          |
| Deane, (T., Captain), withdrawal of, ...                                                                        | 46          |
| Dobson, (G. E., Dr.), extracts from letters of, regarding busts of Drs.<br>Oldham and Stoliczka, ...            | 114, 203    |
| "    "    notes on a collection of Chiroptera from India<br>and Burma, with descriptions of new<br>species, ... | 204         |
| Dogars, tribe of,...                                                                                            | 119         |
| Dog, origin of the domestic, ...                                                                                | 114         |
| Douglas, (J. C., Mr.), appointed Member of the Physical Science<br>Committee, ...                               | 133         |
| Dravidian languages in Central India, ...                                                                       | 16          |
| Drummond, (H., Colonel), withdrawal of, ...                                                                     | 92          |
| Duftry, increase of pay to ...                                                                                  | 41          |
| Electro-magnets, maximum magnetic effect of ...                                                                 | 134         |
| <i>Elephas Indicus</i> , ...                                                                                    | 170         |
| Fath Sháh of Bengal, coin of, ...                                                                               | 265         |
| Feistmantel, (O., Dr.), remarks on the death of Mr. F. B. Meek,...                                              | 70          |
| "    "    reply to Mr. Ball's remarks on his paper<br>on Pot-holes, ...                                         | 143         |

|                                                                                                                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Feistmantel, (O., Dr.), on Giant Kettles (pot-holes) caused by<br>water-action in streams in the Rájmahal<br>and Barákar districts, ... ..                                                                  | 77       |
| <i>Felis jubata</i> , ... ..                                                                                                                                                                                | 169      |
| „ <i>pardus</i> , ... ..                                                                                                                                                                                    | 169, 188 |
| „ <i>uncia</i> , ... ..                                                                                                                                                                                     | 188      |
| Finance, Committee, election of, ... ..                                                                                                                                                                     | 68       |
| „ report on, ... ..                                                                                                                                                                                         | 27       |
| Fírúz Sháh, founder of Hicár Fírúzáh, ... ..                                                                                                                                                                | 92, 118  |
| Flight, organs of, in the Homomorphic Insecta, ... ..                                                                                                                                                       | 54       |
| Flint knives from Makrán, ... ..                                                                                                                                                                            | 157      |
| Floral simulation of <i>Gongylus gongylodes</i> , ... ..                                                                                                                                                    | 193      |
| Formosa, languages of, ... ..                                                                                                                                                                               | 230      |
| Fox, from Balúchistán, ... ..                                                                                                                                                                               | 204      |
| Gaur, inscriptions from, ... ..                                                                                                                                                                             | 265      |
| <i>Gazella Bennettii</i> , ... ..                                                                                                                                                                           | 172      |
| Gharáib-ullughát, Technical Dictionary by 'Abd-ul-Wási', ... ..                                                                                                                                             | 121      |
| Ghosha, Jnánendra Chandra, (Bábu) elected an ordinary Member,                                                                                                                                               | 202      |
| „ Krishna Dhan, (Dr.), elected an ordinary Member, ... ..                                                                                                                                                   | 249      |
| Ghulám 'Alí Bhíkan, of Hánsí, ... ..                                                                                                                                                                        | 121      |
| Giant Kettles, ... ..                                                                                                                                                                                       | 77       |
| Gilgit, mammalia from, ... ..                                                                                                                                                                               | 205      |
| Glass, ancient from Makrán, ... ..                                                                                                                                                                          | 158      |
| Goálpára Hill, geological structure of, ... ..                                                                                                                                                              | 260      |
| Godwin-Austen, (H. H., Major.), descriptions of three new species<br>of Birds belonging to the Gene-<br>ra <i>Pomatorhinus</i> , <i>Actinura</i> ,<br>and <i>Pellorneum</i> , from Saddya,<br>Assam, ... .. | 101      |
| „ „ elected to audit the annual accounts, ... ..                                                                                                                                                            | 46       |
| „ „ remarks on Mr. Campbell's paper<br>on Himalayan Glaciation, ... ..                                                                                                                                      | 4        |
| „ „ remarks on the Manipuris, ... ..                                                                                                                                                                        | 101      |
| „ „ some notes on Birds of the Genera<br><i>Pellorneum</i> and <i>Pomatorhinus</i> ,<br>with a description of a variety of<br><i>Ohleusasicus ruficeps</i> , Blyth, ... ..                                  | 146      |
| <i>Golunda Elliotti</i> , ... ..                                                                                                                                                                            | 168      |
| „ <i>meltada</i> , ... ..                                                                                                                                                                                   | ib.      |
| <i>Gongylus gongylodes</i> , Linn., floral simulation of, ... ..                                                                                                                                            | 193      |
| Gordon, (C. B. P., Mr.), withdrawal of, ... ..                                                                                                                                                              | 46       |

|                                                                                                                                | Page    |
|--------------------------------------------------------------------------------------------------------------------------------|---------|
| Grant, (Alexander, Mr.), compounded for Life-Membership, ...                                                                   | 250     |
| "                    "                    elected an Ordinary Member, ...                                                      | 202     |
| Grihya Sūtras, ...                                                                                                             | 35, 37  |
| Grote, (A., Mr.), letter from, regarding publication of descriptions of the late Mr. W. S. Atkinson's <i>Lepidoptera</i> , ... | 82      |
| <i>Gryllus gongyloides</i> , ...                                                                                               | 194     |
| Hamid Khān, governor of Hānsī, ...                                                                                             | 92, 118 |
| Hānsī, historical notes on, ...                                                                                                | 117     |
| "    inscriptions from, ...                                                                                                    | 121     |
| Hare, new, from Gilgit, ...                                                                                                    | 205     |
| Hart, (J., Mr.) elected an Ordinary Member, ...                                                                                | 202     |
| Hāshim Khān, faujdār of Hisār Fīrūzah, ...                                                                                     | 93      |
| Hāthigumphā inscription at Udayagiri, Cuttack, ...                                                                             | 163     |
| <i>Hemitragus jemlaicus</i> , ...                                                                                              | 188     |
| Hisār Fīrūzah, inscriptions from, ...                                                                                          | 92      |
| "    "    town of, ...                                                                                                         | ib.     |
| Himalayan Glaciation, ...                                                                                                      | 2, 137  |
| "    languages, ...                                                                                                            | 9       |
| Homomorphic Insecta, development of organs of flight of, ...                                                                   | 54      |
| Hughes, (A. J., Mr.), withdrawal of, ...                                                                                       | 68      |
| Hume, (A. O., Mr.), on a supposed new sheep from Kelat, ...                                                                    | 203     |
| Husain Shāh, coins of, ...                                                                                                     | 265     |
| Iṣabah, ...                                                                                                                    | 36      |
| Inscription, copper-plate, from Bhāgalpur, ...                                                                                 | 257     |
| "    from a Mosque-house at Munger, ...                                                                                        | 257     |
| "    from Southern Gateway of the Munger Fort, ...                                                                             | 256     |
| "    from a dome outside Hisār, ...                                                                                            | 98      |
| "    from a Maḡbarah outside Hisār, ...                                                                                        | 97      |
| "    from a Mosque in the village of Ganjahra, district A'zamgarh, ...                                                         | 99      |
| "    from a Mosque in the yard of the Sher Buhlāl's Mausoleum, Hisār, ...                                                      | 99      |
| "    from a Mosque near the Mīrān Sālārī Mosque, Hānsī, ...                                                                    | 124     |
| "    from a Mosque near the Talāqī Gate, Hisār, ...                                                                            | 94      |
| "    from a Mosque outside the Dihlī Gate, Hisār, ...                                                                          | 95      |
| "    from an old Mosque in the village of Chakesar, district A'zamgarh, ...                                                    | 100     |
| "    from a stone at the Dargāh of Pīr Kashānī in Muhammadābād Khās, district A'zamgarh, ...                                   | 101     |
| "    from the Bārsī Gate, Hānsī, ...                                                                                           | 124     |

|                                                                                                                                | <i>Page</i> |
|--------------------------------------------------------------------------------------------------------------------------------|-------------|
| Inscription from the Dini Mosque, Hânsí, ... ..                                                                                | 122         |
| „ from the Jâmi' Mosque of Hisár, ... ..                                                                                       | 96          |
| „ forged in Pali characters, ... ..                                                                                            | 266         |
| „ Hâthigumphá, reading and translation of, ... ..                                                                              | 163         |
| „ illegible, from Balúchistán, ... ..                                                                                          | 158         |
| „ of Jalál-uddín-Mas'úd Jání, of Bengal, ... ..                                                                                | 265         |
| „ of Mahmúd Sháh, of Bengal, ... ..                                                                                            | <i>ib.</i>  |
| „ of Yúsuf Sháh, of Bengal, ... ..                                                                                             | <i>ib.</i>  |
| Inscriptions from district A'zamgarh,... ..                                                                                    | 99          |
| „ from Gaur, ... ..                                                                                                            | 265         |
| Imperial Assemblage held at Delhi 3000 years ago, ... ..                                                                       | 5           |
| Indian Archipelago and Indo-Chinese peninsula, languages of, ... ..                                                            | 205         |
| Indian Museum Act, XXII of 1876, ... ..                                                                                        | 47          |
| „ „ catalogues accepted by Trustees, ... ..                                                                                    | 44          |
| „ „ report on, ... ..                                                                                                          | 27          |
| Insects from Tenasserim, ... ..                                                                                                | 160         |
| Isaac, (T. S., Mr.), appointed Trustee of the Indian Museum on behalf of the Society, ... ..                                   | 68          |
| „ „ re-elected Member of the Council, ... ..                                                                                   | 46          |
| Jalál-uddín Mas'úd Jání, inscription of, from Gaur,... ..                                                                      | 265         |
| Jat tribes in Hisár Fírúzzah, ... ..                                                                                           | 93          |
| Java, languages of, ... ..                                                                                                     | 219         |
| Jeitteles, Professor, researches by, on the origin of the domestic dog, ... ..                                                 | 114         |
| Journal and Proceedings, price of, ... ..                                                                                      | 40          |
| Kaimur (or Kairomali) Range, the, ... ..                                                                                       | 76          |
| Kakhyen, or Kaku, language, ... ..                                                                                             | 210         |
| Kamáon, rock-sculpturings in, ... ..                                                                                           | 54          |
| Kawi language, ... ..                                                                                                          | 224         |
| Kelát, sheep from, ... ..                                                                                                      | 203         |
| Kerr, (Ralph, Major, Lord), withdrawal of, ... ..                                                                              | 92          |
| Khetrán, mounds in valley of, containing pottery, ... ..                                                                       | 159         |
| Khyeng language, ... ..                                                                                                        | 207         |
| King, (W., Mr.), notes of a pre-historic Burial-place, with Cruciform Monoliths near Mungapet in the Nizám's Dominions, ... .. | 189         |
| Kolarian languages, ... ..                                                                                                     | 17          |
| Kripá Rám Gaur, faujdár of Hisár Fírúzzah, ... ..                                                                              | 93          |
| Kumara, Radha Kishor Deb, Juvráj of Hill Tiparah, elected an Ordinary Member, ... ..                                           | 1           |
| Kúnáwari, or Milchan, language, ... ..                                                                                         | 8           |

|                                                                                                          | <i>Page</i>                                   |
|----------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <i>Lagomys auritus</i> , var.,                                                                           | 205                                           |
| „ <i>Roylei</i> ,                                                                                        | 188                                           |
| Lalita Suradeva, King, copper-plate grant of,                                                            | 72                                            |
| Languages, Non-Aryan of India,                                                                           | 6                                             |
| „ of Indo-Chinese Peninsula and the Indian Archipelago,                                                  | 205                                           |
| Lashkar, title of,                                                                                       | 266                                           |
| La Touch, (J. Digges, Mr.), elected an ordinary Member,                                                  | 202                                           |
| Leonard, (G. S., Mr.), the Mythic History of the God Viráj,                                              | 81                                            |
| Lepcha language,                                                                                         | 10                                            |
| <i>Lepidoptera</i> , descriptions of new, intended publication of,                                       | 81, 134, 202                                  |
| <i>Lepus Biddulphi</i> , n. s.,                                                                          | 205                                           |
| „ <i>Pamirensis</i> ,                                                                                    | <i>ib.</i>                                    |
| „ <i>Tibetanus</i> ,                                                                                     | <i>ib.</i>                                    |
| Lewis, (T. R., Dr.), remarks on Mr. Whitty's paper on death<br>by Lightning in a Mine,                   | 103                                           |
| Library, additions to,                                                                                   | 20, 61, 83, 104, 126, 150, 172, 196, 233, 269 |
| „ Catalogue, special assistant appointed for,                                                            | 134                                           |
| „ Committee, election of,                                                                                | 68                                            |
| „ Report on,                                                                                             | 31                                            |
| Lightning, conductors,                                                                                   | 132                                           |
| „ death by, in a mine,                                                                                   | 102                                           |
| „ evolution of <i>potential</i> and <i>quantity</i> of discharge of,                                     | 56                                            |
| List of Societies and Institutions with which exchanges of Publi-<br>cations have been made during 1876, | 37                                            |
| Lohitic languages,                                                                                       | 12                                            |
| <i>Lonchodes Baucis</i> ,                                                                                | 162                                           |
| „ <i>Botanicus</i> ,                                                                                     | <i>ib.</i>                                    |
| „ <i>Godama</i> , n. s.,                                                                                 | <i>ib.</i>                                    |
| „ <i>porus</i> ,                                                                                         | <i>ib.</i>                                    |
| „ <i>virgea</i> ,                                                                                        | <i>ib.</i>                                    |
| London Agency, report on,                                                                                | 30                                            |
| <i>Lopaphus Iolas</i> ,                                                                                  | 162                                           |
| <i>Lutra</i> , sp.,                                                                                      | 205                                           |
| Lydekker, (R., Mr.), Notes on the Mammalian Fauna of the<br>Wardwán and Upper Chenáb valleys,            | 188                                           |
| <i>Macacus rhesus</i> ,                                                                                  | 188                                           |
| Madagascar, languages of,                                                                                | 230                                           |
| Mahárájá of Darbhanga, elected an ordinary Member,                                                       | 132                                           |
| Mahmúd of Ghazní, takes Hápsí,                                                                           | 117                                           |
| Mahmúd Sháh (III), nick-named <i>Badr-i-Sháhlí</i> , inscription of,                                     | 265                                           |
| Makhsús Khán, inscription of, at Munger,                                                                 | 257                                           |

|                                                                                                                                         | <i>Page</i>   |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Malay Archipelago, languages of, ... ..                                                                                                 | 218           |
| Maldives and Laccadives, languages of, ... ..                                                                                           | 217           |
| Mamh of Balúchistán, ... ..                                                                                                             | 204           |
| Mammalian fauna of Wardwán and Upper Chenáb valleys, ...                                                                                | 188           |
| Mammalia from Gilgit, ... ..                                                                                                            | 205           |
| Mammals occurring in the Basin of the Mahánadi, ... ..                                                                                  | 168           |
| Mandelli, (L. M., Mr.), elected an Ordinary Member, ...                                                                                 | 249           |
| Manipuri Character, note on the, ... ..                                                                                                 | 101           |
| Marshall, (G. F. L., Captain), elected an Ordinary Member, ...                                                                          | 46            |
| McConnell, (J. F. P., Dr.), withdrawal of, ... ..                                                                                       | 156           |
| McGregor, (W., Mr.), on Lightning Conductors, ... ..                                                                                    | 132           |
| Medlicott, (H. B., Mr.), appointed Member of the Library Com-<br>mittee, ... ..                                                         | 133           |
| „ „ elected Treasurer and Member of Council, ...                                                                                        | 45            |
| „ „ remarks on Mr. Campbell's paper on Hi-<br>malayan Glaciation, ... ..                                                                | 8             |
| „ „ remarks on the geological structure of<br>Goalpára Hill, ... ..                                                                     | 264           |
| Medlycott, (A. E., Rev.), elected an Ordinary Member, ... ..                                                                            | 68            |
| Meek, (F. B., Mr.), death of, announced, ... ..                                                                                         | 70            |
| <i>Megaderma lyra</i> , ... ..                                                                                                          | 204           |
| Members, list of, for 1876, ... ..                                                                                                      | Appendix, ii. |
| Metád Rat, ... ..                                                                                                                       | 168           |
| Meteorological Observations for January, February, March, ...                                                                           | i, ix, xvii.  |
| Midnapur, <i>Gongylus gongylodes</i> from, ... ..                                                                                       | 193           |
| Mihnati, of Hánís, Qázi of Sarhind, ... ..                                                                                              | 93            |
| Miles, (S. B., Colonel), on the route between Sohár and el-Bereymí<br>in 'Omán, with a note on the Zatt or<br>Gypsies in Arabia, ... .. | 125           |
| Mockler, (E., Major), pottery &c., found by, in Makrán, Balúchistán, ...                                                                | 157           |
| Mollusca from Yarkand and Ladak, ... ..                                                                                                 | 56            |
| „ from Yunan and Upper Burma, ... ..                                                                                                    | ib.           |
| Mon language, ... ..                                                                                                                    | 207           |
| Monoliths, cruciform, near Mungapet, in the Nizám's dominions, ...                                                                      | 189           |
| Monthly General Meetings, ... 1, 46, 67, 91, 113, 131, 181, 201, ...                                                                    | 249           |
| <i>Moschus moschiferus</i> , ... ..                                                                                                     | 188           |
| Mubárák Khán Sarwání, faujdár of Hisár Fírúzah, ... ..                                                                                  | 93            |
| Mughís, a poet of Hánís, ... ..                                                                                                         | 120           |
| Muhammad 'Adil Sháh, rupee of, ... ..                                                                                                   | 156           |
| „ 'Alí Beg, faujdár of Hánís, ... ..                                                                                                    | 93            |
| „ Husain, faujdár of Hisár Fírúzah, ... ..                                                                                              | 93            |



|                                                                                                                                                                                               | <i>Page</i>      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Muhammad Sâlih, builder of Mosque at A'zamgarh, ... ..                                                                                                                                        | 100              |
| Muir, (J., Dr.), elected an Honorary Member, ... ..                                                                                                                                           | 1                |
| Mungapet, (Nizâm's Dominions), Cruciform Monoliths from, ... ..                                                                                                                               | 189              |
| Munger, Inscriptions from, ... ..                                                                                                                                                             | 256              |
| Murrhian cups, ... ..                                                                                                                                                                         | 160              |
| Murshidâbâd, Makhsûsâbâd, Muxadavad, ... ..                                                                                                                                                   | 257              |
| <i>Mus</i> , sp., .., ... ..                                                                                                                                                                  | 205              |
| „ <i>Bactrianus</i> , ... ..                                                                                                                                                                  | <i>ib.</i>       |
| „ <i>Sumatrensis</i> , ... ..                                                                                                                                                                 | 149              |
| <i>Mustela kathiah</i> , ... ..                                                                                                                                                               | 188              |
| „ <i>Stoliczka</i> , n. s., ... ..                                                                                                                                                            | 148              |
| „ <i>vulgaris</i> , ... ..                                                                                                                                                                    | <i>ib.</i>       |
| Nanda, King of Magadha, overthrow of, ... ..                                                                                                                                                  | 165              |
| Nandâvarta, emblem of the 23rd Jain, Ara, ... ..                                                                                                                                              | <i>ib.</i>       |
| Nârâyanapâla Devâ, seal of, on inscription from Bhâgalpur, ... ..                                                                                                                             | 257              |
| Nârnaul, ... ..                                                                                                                                                                               | 93               |
| Natural History Committee, election of, ... ..                                                                                                                                                | 69               |
| <i>Nemorhædus goral</i> , ... ..                                                                                                                                                              | 188              |
| Nepalese MSS., catalogue of, ... ..                                                                                                                                                           | 44               |
| Nevill, (G., Mr.), List of the Mollusca collected by Dr. J. Anderson,<br>in Yunan and Upper Burma, with descrip-<br>tions of new species, (Title only), ... ..                                | 56               |
| „ „ List of the Mollusca collected by the late Dr.<br>Stoliczka when attached to the Embassy<br>under Sir D. Forsyth in Yarkand and Ladak,<br>with descriptions of new species, (Title only), | <i>ib.</i>       |
| „ „ withdrawal of, ... ..                                                                                                                                                                     | 92               |
| Newt from Darjiling, ... ..                                                                                                                                                                   | 53               |
| Nicobarese language, ... ..                                                                                                                                                                   | 217              |
| Nitisâra, ... ..                                                                                                                                                                              | 85, 37           |
| Non-Aryan Languages of India, ... ..                                                                                                                                                          | 6                |
| Officers, election of, ... ..                                                                                                                                                                 | 45               |
| O'Kinealy, (J., Mr.), elected Member of the Council, ... ..                                                                                                                                   | <i>ib.</i>       |
| Oldenburg, (H., Dr.), letter from, regarding a new edition of the<br><i>Vinayapitakam</i> , ... ..                                                                                            | 182              |
| Oldham (Dr. T.) to receive Society's publications free, ... ..                                                                                                                                | 43               |
| „ Memorial, ... ..                                                                                                                                                                            | 41, 71, 114, 203 |
| <i>Ovis Blanfordi</i> , ... ..                                                                                                                                                                | 204              |
| „ <i>cycloceros</i> , ... ..                                                                                                                                                                  | 203              |
| „ <i>Hodgsoni</i> , ... ..                                                                                                                                                                    | 204              |
| „ <i>Karelini</i> , ... ..                                                                                                                                                                    | 203              |

|                                                                                                                                  | Page         |
|----------------------------------------------------------------------------------------------------------------------------------|--------------|
| <i>Ovis Vignei</i> , ... ..                                                                                                      | 203          |
| Pándukesvar, near Baidyanáth, Kamáon, copper-plate from, ...                                                                     | 72           |
| <i>Paratelphusa Edwardsii</i> , ... ..                                                                                           | 102          |
| „ <i>Limborgi</i> , ... ..                                                                                                       | ib.          |
| „ <i>Sinensis</i> , ... ..                                                                                                       | ib.          |
| Peal, (S. E., Mr.), on pot-holes, the geological structure of Goal-<br>pára Hill and movements of the clouds in Upper Assam, ... | 260          |
| <i>Pellorneum minor</i> , ... ..                                                                                                 | 146          |
| „ <i>pectoralis</i> , ... ..                                                                                                     | 102          |
| „ <i>ruficeps</i> , ... ..                                                                                                       | 146          |
| „ <i>subochraceum</i> , ... ..                                                                                                   | ib.          |
| „ <i>Tickelli</i> , ... ..                                                                                                       | ib.          |
| Peters, (S. T., Dr.), elected an Ordinary Member, ... ..                                                                         | 181          |
| <i>Phibalosoma acanthopus</i> , ... ..                                                                                           | 161, 162     |
| „ <i>Annamallayanum</i> , n. s., ... ..                                                                                          | 161          |
| „ <i>Cantori</i> , ... ..                                                                                                        | ib.          |
| „ <i>Westwoodii</i> , ... ..                                                                                                     | ib.          |
| „ <i>virgea</i> , ... ..                                                                                                         | ib.          |
| Philippine Islands, languages of, ... ..                                                                                         | 229          |
| Philological Committee, election of, ... ..                                                                                      | 69           |
| <i>Phyllorhina fulva</i> , ... ..                                                                                                | 204          |
| „ <i>larvata</i> , ... ..                                                                                                        | ib.          |
| „ <i>speoris</i> , ... ..                                                                                                        | ib.          |
| Physical Science Committee, election of, ... ..                                                                                  | 69           |
| Pictures, renovation of, ... ..                                                                                                  | 33           |
| <i>Plethodon persimilis</i> , ... ..                                                                                             | 53           |
| <i>Pomatorhinus hypoleucus</i> , ... ..                                                                                          | 147          |
| „ <i>Inglisi</i> , ... ..                                                                                                        | ib.          |
| „ <i>stenorhynchus</i> , ... ..                                                                                                  | 102          |
| Pot-holes, ... ..                                                                                                                | 77, 140, 260 |
| Pottery, ancient, from Balúchistán, ... ..                                                                                       | 157          |
| Prannath Pandit, (Bábu), elected Member of the Council, ...                                                                      | 46           |
| „ „ Note on two Copper-plate grants of the<br>Chandel Dynasty of the eleventh and<br>twelfth centuries of the Samvat era, ...    | 192          |
| <i>Pteromys inornatus</i> , ... ..                                                                                               | 188          |
| „ <i>Oral</i> , ... ..                                                                                                           | 169          |
| „ <i>petaurista</i> , ... ..                                                                                                     | ib.          |
| Pratápanaráyana Sifíha, (Bábu), elected an Ordinary Member, ...                                                                  | 202          |
| Premchand Chaudari, pay increased, ... ..                                                                                        | 42           |
| Publications, Report on, ... ..                                                                                                  | 32           |

|                                                                                                                                                  | <i>Page</i> |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Rájá Bijaya Lashkar, ... ..                                                                                                                      | 266         |
| „ Káns Náráyan, of Táhirpur,... ..                                                                                                               | <i>ib.</i>  |
| Rájasúya, or ceremony of Imperial baptism, ... ..                                                                                                | 5           |
| Rájdendralála Mitra, (Dr.), an Imperial Assemblage held at Delhi,<br>3000 years ago, ... ..                                                      | 5           |
| „ „ elected Vice-President and Member of<br>Council, ... ..                                                                                      | 45          |
| „ „ exhibition of, and remarks on, a Copper-<br>plate from Pándukésvar, ... ..                                                                   | 71          |
| „ „ exhibition and remarks on a Copper-<br>plate inscription from Bhagalpur, ... ..                                                              | 257         |
| „ „ exhibition and revised reading of the<br>Háthigumphá inscription at Udayagiri, ... ..                                                        | 163         |
| „ „ on illegible inscriptions from Balúchistán, ... ..                                                                                           | 158         |
| „ „ on pottery from Balúchistán, ... ..                                                                                                          | 160         |
| „ „ on the arches of Buddha Gayá, ... ..                                                                                                         | 259         |
| „ „ on the authenticity of a Palí Inscription<br>received from Mr. V. A. Smith, ... ..                                                           | 266         |
| „ „ remarks on Cruciform Monoliths, ... ..                                                                                                       | 190         |
| „ „ remarks on three bricks brought from<br>Buddha Gayá, ... ..                                                                                  | 258         |
| „ „ submission by, of a descriptive Catalogue<br>of the Society's Sanskrit MSS., ... ..                                                          | 183         |
| Rás, site of Hisár Fírúzah, ... ..                                                                                                               | 92          |
| Rat, Metád, ... ..                                                                                                                               | 168         |
| Ravenshaw, (T. E., the Hon'ble), elected an Ordinary Member, ... ..                                                                              | 113         |
| Reeves, (J. C., Mr.), elected an Ordinary Member, ... ..                                                                                         | 181         |
| Registration of the Society,... ..                                                                                                               | 34          |
| Repairs and alterations, ... ..                                                                                                                  | 33          |
| Revised Rules, ... ..                                                                                                                            | 32          |
| <i>Rhinoceros Sondaicus</i> ,... ..                                                                                                              | 170         |
| <i>Rhizomys cinerea</i> , ... ..                                                                                                                 | 149         |
| „ <i>erythrogyens</i> , ... ..                                                                                                                   | 150         |
| „ <i>Sumatrensis</i> , ... ..                                                                                                                    | 149         |
| Rivett-Carnac, (H., Mr.), on some Ancient Sculpturings on Rocks<br>in Kamáon, similar to those found on<br>Monoliths and Rocks in Europe, ... .. | 54          |
| <i>Ruticilla schisticeps</i> , ... ..                                                                                                            | 76          |
| Sadiya, Assam, birds from, ... ..                                                                                                                | 101         |
| Saif Khán Bárha, faujdár of Hisár Fírúzah, ... ..                                                                                                | 93          |
| Salábat Khán Bárha, faujdár of Hisár Fírúzah, ... ..                                                                                             | <i>ib.</i>  |

|                                                                                                           | Page    |
|-----------------------------------------------------------------------------------------------------------|---------|
| Sandford, (W., Mr.), elected an Ordinary Member, ...                                                      | 113     |
| Saṁhita of Black Yajur Veda, ...                                                                          | 36, 37  |
| Saṁhitās of Sama Veda, ...                                                                                | 34, 36  |
| Sanskrit MSS., Society's, Catalogue of, ...                                                               | 31, 183 |
| Sarsuti, now called Sirsā, ...                                                                            | 92      |
| Sawái, title of, ...                                                                                      | 266     |
| Schefer, M., to receive Society's publications, ...                                                       | 41      |
| <i>Sciurus maximus</i> , ...                                                                              | 170     |
| Scientific Club at Vienna, invitation from, ...                                                           | 71      |
| <i>Scotophilus pallidus</i> , ...                                                                         | 204     |
| „ <i>Temmincki</i> , ...                                                                                  | ib.     |
| Secretary's office, report on, ...                                                                        | 34      |
| <i>Semnopithecus schistaceus</i> , ...                                                                    | 188     |
| Shahdád Khán Khweshagí, faujdár of Hámśi and Hisár, ...                                                   | 119     |
| Shan States, languages of, ...                                                                            | 211     |
| Sheep from Central Hills of Kelát, ...                                                                    | 203     |
| Shrews, Asiatic, ...                                                                                      | 168     |
| „ tree, ...                                                                                               | ib.     |
| Shukrí mosque, at Hámśi, ...                                                                              | 117     |
| Siam, languages of, ...                                                                                   | 212     |
| Smith, (D. B., Dr.), elected Member of the Council, ...                                                   | 46      |
| „ (V. A., Mr.), on the Bhars of Bundelkhand, with an account<br>of an Inscription in Páli characters, ... | 266     |
| Sohár and el-Bereymí, in 'Omán, route between, ...                                                        | 125     |
| Spens, (A. N. W., the Rev.), elected an Ordinary Member, ...                                              | 91      |
| Spice Islands, languages of, ...                                                                          | 228     |
| Srí Dhanga Deva, the Lord of Kálinjara, ...                                                               | 192     |
| Stoliczka, (F., Dr.), bust of, ...                                                                        | 203     |
| „ exhibition of portrait of, ...                                                                          | 70      |
| Stone hammers from Makrán, ...                                                                            | 159     |
| Sumatra, languages of, ...                                                                                | 226     |
| <i>Sus Indicus</i> , ...                                                                                  | 188     |
| Sutkágén Dor, Balúchistán, pottery from, ...                                                              | 157     |
| Sweeper, increase of pay to, ...                                                                          | 42      |
| Ṭabaqát-i-Náçirí, ...                                                                                     | 36      |
| Tagáls of Phillipine Islands, languages of, ...                                                           | 219     |
| Tántric symbol, ...                                                                                       | 165     |
| Telegraph receiving instrument, best resistance of, ...                                                   | 184     |
| <i>Telphusa Larnaudii</i> , ...                                                                           | 102     |
| „ <i>lobifrons</i> , ...                                                                                  | ib.     |
| Tenasserim, insects from, ...                                                                             | 160     |

|                                                                                      | Page       |
|--------------------------------------------------------------------------------------|------------|
| Tenasserim, languages of, ... ..                                                     | 208        |
| „ new crustacea from, ... ..                                                         | 102        |
| „ zoological exploration of, ... ..                                                  | 2          |
| Tennant, (J. F., Colonel), appointed Member of Council, ...                          | 114        |
| <i>Thaumantis Cambodia</i> , ... ..                                                  | 163        |
| „ <i>Camadeva</i> , ... ..                                                           | <i>ib.</i> |
| „ <i>Howqua</i> , ... ..                                                             | <i>ib.</i> |
| „ <i>Louisa</i> , n. s., ... ..                                                      | <i>ib.</i> |
| „ <i>Nourmahal</i> , ... ..                                                          | <i>ib.</i> |
| Theobald, (W., Mr.), remarks on Mr. Campbell's paper on Himalayan Glaciation, ... .. | 137        |
| Thibetan languages, ... ..                                                           | 7          |
| Thomas, George, reigns over Hánsí, ... ..                                            | 119        |
| Thuillier, (H. L., Genl.), elected Vice-President, ... ..                            | 45         |
| „ „ remarks by, on the Annual Report for 1876, ... ..                                | 44         |
| Tremlett, (J. D., Mr.), compounded for Life-Membership, ... ..                       | 182        |
| Trustee of the Museum, appointment of additional, ... ..                             | 68         |
| <i>Tupaia Elliotti</i> , ... ..                                                      | 168        |
| <i>Turdinus guttatus</i> , ... ..                                                    | 102        |
| „ <i>Williamsoni</i> , ... ..                                                        | <i>ib.</i> |
| <i>Tylototriton verrucosus</i> , ... ..                                              | 53         |
| <i>Ursus arctus</i> , ... ..                                                         | 204        |
| „ <i>Gedrosianus</i> , ... ..                                                        | <i>ib.</i> |
| „ <i>isabellinus</i> , ... ..                                                        | 188, 204   |
| „ <i>labiatus</i> , ... ..                                                           | <i>ib.</i> |
| „ <i>pruinus</i> , ... ..                                                            | 205        |
| „ <i>Syriacus</i> , ... ..                                                           | 204        |
| „ <i>Tibetanus</i> , ... ..                                                          | 205        |
| „ <i>torquatus</i> , ... ..                                                          | <i>ib.</i> |
| Vanrenen, (A. D., Colonel), withdrawal of, ... ..                                    | 182        |
| Vedánta Sútras, ... ..                                                               | 35         |
| <i>Vesperugo Abramus</i> , ... ..                                                    | 204        |
| „ ( <i>Hesperoptenus</i> ) <i>Blanfordi</i> , n. sp., ... ..                         | <i>ib.</i> |
| „ „ <i>Tickelli</i> , ... ..                                                         | <i>ib.</i> |
| „ <i>Kuhlíi</i> , ... ..                                                             | <i>ib.</i> |
| „ ( <i>Vesperus</i> ) <i>nasutus</i> , n. s., ... ..                                 | <i>ib.</i> |
| Vienna, Scientific Club at, ... ..                                                   | 71         |
| Vinayapitakam, new edition of, ... ..                                                | 182        |
| Vindhya-máli, or Kaimúr Mountains, ... ..                                            | 76         |
| Viráj, Mythic History of the God, ... ..                                             | 81         |
| Vrata, (Mahara Chandra, Bábu), elected an Ordinary Member, ...                       | 181        |

|                                                                                                                                                                  | <i>Page</i> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <i>Vulpes canus</i> , ... ..                                                                                                                                     | 205         |
| „ <i>flavescens</i> , ... ..                                                                                                                                     | 188         |
| „ <i>leucopus</i> ,... ..                                                                                                                                        | <i>ib.</i>  |
| „ <i>montanus</i> , ... ..                                                                                                                                       | 205         |
| Waldie, (D., Dr.), appointed Scrutineer for election of officers, ...                                                                                            | 25          |
| „ „ elected to audit the annual accounts, ...                                                                                                                    | 46          |
| Waller, (W. K., Dr.), elected Member of the Council, ... ..                                                                                                      | 46          |
| Wáltú Khán, ... ..                                                                                                                                               | 97          |
| Wardwán and Upper Chenáb Valleys, fauna of, ... ..                                                                                                               | 188         |
| Weasel from Yarkand, ... ..                                                                                                                                      | 148         |
| Whitty, (I. J., Mr.), note on a case of death by Lightning in a Mine, ... ..                                                                                     | 102         |
| „ „ elected an ordinary Member, ... ..                                                                                                                           | 91          |
| Wise, (J., Dr.), compounded for Life-Membership, ... ..                                                                                                          | 250         |
| Wood-Mason, (J., Mr.), description of two new species of fresh-water <i>Crustacea</i> , obtained by Mr. O. Limbörg in the Houg-da-ran valley, Tenasserim, ... .. | 102         |
| „ „ exhibition and description of several little known insects collected by Mr. O. Limbörg from Upper Tenasserim, ...                                            | 160         |
| „ „ exhibition of, and remarks on, a Newt from Darjiling, ... ..                                                                                                 | 53          |
| „ „ on the final stage in the development of the organs of flight in the <i>Homomorphic Insecta</i> , ... ..                                                     | 54          |
| Yajáti, the founder of the Kesarí dynasty, copper-plate grant of, ..                                                                                             | 125         |
| Zatt, or Gypsies, of Arabia, ... ..                                                                                                                              | <i>ib.</i>  |
| Zoological Exploration of Tenasserim, ... ..                                                                                                                     | 2           |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January 1877.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the sea level, 18.11 feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |      |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o    |
| 1     | 30.068                                          | 30.144                                    | 30.015  | 0.129   | 65.5                          | 75.0                                          | 57.5 | 17.5 |
| 2     | .075                                            | .148                                      | .012    | .136    | 66.6                          | 76.6                                          | 58.5 | 18.1 |
| 3     | .082                                            | .161                                      | .039    | .122    | 66.8                          | 77.0                                          | 58.5 | 18.5 |
| 4     | .088                                            | .151                                      | .036    | .115    | 66.6                          | 77.0                                          | 58.9 | 18.1 |
| 5     | .095                                            | .152                                      | .051    | .101    | 66.8                          | 76.0                                          | 59.2 | 16.8 |
| 6     | .115                                            | .194                                      | .047    | .147    | 66.9                          | 76.6                                          | 59.0 | 17.6 |
| 7     | .110                                            | .187                                      | .063    | .124    | 68.9                          | 78.7                                          | 61.4 | 17.3 |
| 8     | .112                                            | .173                                      | .064    | .109    | 68.0                          | 77.2                                          | 59.2 | 18.0 |
| 9     | .110                                            | .194                                      | .037    | .157    | 68.2                          | 77.7                                          | 60.5 | 17.2 |
| 10    | .075                                            | .151                                      | .019    | .132    | 68.3                          | 78.0                                          | 60.4 | 17.6 |
| 11    | .093                                            | .168                                      | .034    | .134    | 69.0                          | 79.0                                          | 60.5 | 18.5 |
| 12    | .094                                            | .189                                      | .018    | .171    | 70.0                          | 79.8                                          | 62.2 | 17.6 |
| 13    | .092                                            | .153                                      | .029    | .124    | 65.4                          | 79.0                                          | 63.5 | 5.5  |
| 14    | .110                                            | .168                                      | .046    | .122    | 63.8                          | 67.3                                          | 61.3 | 6.0  |
| 15    | .176                                            | .242                                      | .131    | .111    | 64.2                          | 72.0                                          | 57.5 | 14.5 |
| 16    | .219                                            | .301                                      | .169    | .132    | 64.3                          | 70.5                                          | 60.5 | 10.0 |
| 17    | .188                                            | .260                                      | .136    | .124    | 65.8                          | 73.8                                          | 58.3 | 15.5 |
| 18    | .171                                            | .246                                      | .114    | .132    | 68.1                          | 77.0                                          | 60.5 | 16.5 |
| 19    | .172                                            | .251                                      | .124    | .127    | 68.7                          | 77.4                                          | 62.0 | 15.4 |
| 20    | .118                                            | .186                                      | .051    | .135    | 66.9                          | 74.0                                          | 60.6 | 13.4 |
| 21    | .069                                            | .142                                      | .017    | .125    | 67.0                          | 75.4                                          | 59.5 | 15.9 |
| 22    | .067                                            | .151                                      | .010    | .141    | 67.5                          | 76.6                                          | 60.5 | 16.1 |
| 23    | .105                                            | .177                                      | .049    | .128    | 65.4                          | 70.0                                          | 61.4 | 8.6  |
| 24    | .134                                            | .208                                      | .084    | .124    | 67.9                          | 78.5                                          | 59.4 | 19.1 |
| 25    | .090                                            | .162                                      | .015    | .147    | 68.3                          | 77.2                                          | 60.0 | 17.2 |
| 26    | .047                                            | .122                                      | 29.990  | .132    | 68.3                          | 76.5                                          | 60.2 | 16.3 |
| 27    | .078                                            | .159                                      | 30.033  | .126    | 69.0                          | 77.8                                          | 62.5 | 15.3 |
| 28    | .074                                            | .150                                      | .019    | .131    | 68.9                          | 78.3                                          | 60.5 | 17.8 |
| 29    | .015                                            | .089                                      | 29.955  | .134    | 70.7                          | 79.5                                          | 62.5 | 17.0 |
| 30    | 29.966                                          | .049                                      | .919    | .130    | 74.1                          | 83.0                                          | 68.5 | 14.5 |
| 31    | .983                                            | .068                                      | .908    | .160    | 72.0                          | 78.0                                          | 66.8 | 11.2 |

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means, are derived, from the hourly observations, made at the several hours during the day.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January 1877.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Humi-<br>dity, complete satu-<br>ration being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | Gr.                                              | Gr.                                                                 |                                                                     |
| 1     | 59.1                            | 6.4                 | 54.0                | 11.5                         | 0.428                            | 4.74                                             | 2.24                                                                | 0.68                                                                |
| 2     | 60.8                            | 5.8                 | 56.2                | 10.4                         | .461                             | 5.11                                             | .10                                                                 | .71                                                                 |
| 3     | 61.1                            | 5.7                 | 56.5                | 10.3                         | .465                             | .15                                              | .11                                                                 | .71                                                                 |
| 4     | 60.9                            | 5.7                 | 56.3                | 10.3                         | .462                             | .13                                              | .08                                                                 | .71                                                                 |
| 5     | 60.9                            | 5.9                 | 56.2                | 10.6                         | .461                             | .10                                              | .16                                                                 | .70                                                                 |
| 6     | 60.6                            | 6.3                 | 55.6                | 11.3                         | .452                             | .01                                              | .27                                                                 | .69                                                                 |
| 7     | 61.8                            | 7.1                 | 56.1                | 12.8                         | .459                             | .06                                              | .68                                                                 | .65                                                                 |
| 8     | 61.3                            | 6.7                 | 55.9                | 12.1                         | .456                             | .04                                              | .49                                                                 | .67                                                                 |
| 9     | 61.3                            | 6.9                 | 55.8                | 12.4                         | .455                             | .03                                              | .55                                                                 | .66                                                                 |
| 10    | 62.4                            | 5.9                 | 57.7                | 10.6                         | .485                             | .31                                              | .26                                                                 | .70                                                                 |
| 11    | 63.0                            | 6.0                 | 58.2                | 10.8                         | .493                             | .43                                              | .33                                                                 | .70                                                                 |
| 12    | 64.1                            | 5.9                 | 59.4                | 10.6                         | .513                             | .63                                              | .37                                                                 | .70                                                                 |
| 13    | 64.1                            | 1.3                 | 63.1                | 2.3                          | .580                             | 6.44                                             | 0.51                                                                | .93                                                                 |
| 14    | 62.2                            | 1.6                 | 60.8                | 3.0                          | .537                             | 5.98                                             | .63                                                                 | .91                                                                 |
| 15    | 60.8                            | 3.4                 | 57.7                | 6.5                          | .485                             | .38                                              | 1.31                                                                | .80                                                                 |
| 16    | 61.1                            | 2.3                 | 58.2                | 6.1                          | .493                             | .48                                              | .24                                                                 | .82                                                                 |
| 17    | 62.3                            | 3.5                 | 59.5                | 6.3                          | .515                             | .71                                              | .33                                                                 | .81                                                                 |
| 18    | 63.8                            | 4.3                 | 60.4                | 7.7                          | .530                             | .85                                              | .70                                                                 | .78                                                                 |
| 19    | 63.4                            | 5.3                 | 59.2                | 9.5                          | .509                             | .62                                              | 2.07                                                                | .73                                                                 |
| 20    | 61.2                            | 5.7                 | 56.6                | 10.3                         | .467                             | .17                                              | .11                                                                 | .71                                                                 |
| 21    | 61.3                            | 5.7                 | 56.7                | 10.3                         | .469                             | .18                                              | .12                                                                 | .71                                                                 |
| 22    | 61.5                            | 6.0                 | 56.7                | 10.8                         | .469                             | .17                                              | .25                                                                 | .70                                                                 |
| 23    | 61.4                            | 4.0                 | 58.2                | 7.2                          | .493                             | .47                                              | 1.48                                                                | .79                                                                 |
| 24    | 62.7                            | 5.2                 | 58.5                | 9.4                          | .498                             | .50                                              | 2.01                                                                | .73                                                                 |
| 25    | 61.7                            | 6.6                 | 56.4                | 11.9                         | .464                             | .11                                              | .49                                                                 | .67                                                                 |
| 26    | 62.4                            | 5.9                 | 57.7                | 10.6                         | .485                             | .34                                              | .26                                                                 | .70                                                                 |
| 27    | 62.9                            | 6.1                 | 58.0                | 11.0                         | .489                             | .39                                              | .37                                                                 | .70                                                                 |
| 28    | 62.2                            | 6.7                 | 56.8                | 12.1                         | .470                             | .18                                              | .56                                                                 | .67                                                                 |
| 29    | 66.3                            | 4.4                 | 62.8                | 7.9                          | .574                             | 6.31                                             | 1.87                                                                | .77                                                                 |
| 30    | 70.3                            | 3.8                 | 67.6                | 6.5                          | .672                             | 7.34                                             | .73                                                                 | .81                                                                 |
| 31    | 68.8                            | 3.2                 | 66.2                | 5.8                          | .642                             | .03                                              | .47                                                                 | .88                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January 1877.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer at<br>32° Fahr. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                             | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                | o    | o     |
| Mid-<br>night. | 30.105                                          | 30.217                                                       | 29.969  | 0.248   | 64.6                          | 72.5                                                             | 61.0 | 11.5  |
| 1              | .096                                            | .207                                                         | .957    | .250    | 63.9                          | 71.0                                                             | 60.5 | 10.5  |
| 2              | .085                                            | .216                                                         | .947    | .269    | 63.2                          | 69.2                                                             | 60.0 | 9.2   |
| 3              | .077                                            | .199                                                         | .933    | .266    | 62.6                          | 69.0                                                             | 59.5 | 9.5   |
| 4              | .070                                            | .185                                                         | .936    | .249    | 62.1                          | 68.7                                                             | 59.0 | 9.7   |
| 5              | .081                                            | .190                                                         | .958    | .232    | 61.5                          | 68.5                                                             | 58.5 | 10.0  |
| 6              | .096                                            | .198                                                         | .990    | .208    | 61.0                          | 68.5                                                             | 58.0 | 10.5  |
| 7              | .116                                            | .206                                                         | 30.004  | .202    | 60.9                          | 68.8                                                             | 57.5 | 11.3  |
| 8              | .142                                            | .239                                                         | .007    | .232    | 62.5                          | 70.0                                                             | 59.0 | 11.0  |
| 9              | .165                                            | .277                                                         | .046    | .231    | 66.1                          | 71.5                                                             | 62.7 | 8.8   |
| 10             | .170                                            | .301                                                         | .049    | .252    | 69.1                          | 74.5                                                             | 64.0 | 10.5  |
| 11             | .152                                            | .288                                                         | .023    | .265    | 71.6                          | 77.0                                                             | 64.0 | 13.0  |
| Noon.          | .120                                            | .267                                                         | 29.990  | .277    | 73.3                          | 78.6                                                             | 65.2 | 13.4  |
| 1              | .087                                            | .223                                                         | .959    | .264    | 74.5                          | 80.0                                                             | 65.5 | 14.5  |
| 2              | .063                                            | .193                                                         | .930    | .263    | 75.5                          | 81.0                                                             | 65.2 | 15.8  |
| 3              | .048                                            | .169                                                         | .917    | .252    | 75.8                          | 83.0                                                             | 64.9 | 18.1  |
| 4              | .043                                            | .176                                                         | .908    | .268    | 74.7                          | 82.0                                                             | 64.0 | 18.0  |
| 5              | .050                                            | .169                                                         | .919    | .250    | 73.6                          | 80.8                                                             | 64.0 | 16.8  |
| 6              | .061                                            | .187                                                         | .931    | .256    | 71.1                          | 78.8                                                             | 64.0 | 14.8  |
| 7              | .075                                            | .205                                                         | .934    | .271    | 69.4                          | 76.0                                                             | 64.0 | 12.0  |
| 8              | .092                                            | .227                                                         | .963    | .264    | 68.2                          | 74.6                                                             | 63.0 | 11.6  |
| 9              | .103                                            | .250                                                         | .958    | .292    | 67.1                          | 73.5                                                             | 62.5 | 11.0  |
| 10             | .109                                            | .252                                                         | .960    | .292    | 66.2                          | 72.5                                                             | 62.2 | 10.3  |
| 11             | .107                                            | .232                                                         | .951    | .281    | 65.5                          | 72.0                                                             | 61.3 | 10.7  |

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb  
Thermometer Means, are derived from the observations made at the several  
hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Cutcutta,  
in the month of January 1877.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued).

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Gr.                                              | Gr.                                                                 |                                                                     |
| Mid-<br>night. | 61.7                            | 2.9                 | 59.4                | 5.2                          | 0.513                            | 5.70                                             | 1.08                                                                | 0.84                                                                |
| 1              | 61.1                            | 2.8                 | 58.6                | 5.3                          | .499                             | .56                                              | .07                                                                 | .84                                                                 |
| 2              | 60.6                            | 2.6                 | 58.3                | 4.9                          | .494                             | .50                                              | 0.99                                                                | .85                                                                 |
| 3              | 60.1                            | 2.5                 | 57.8                | 4.8                          | .486                             | .43                                              | .94                                                                 | .85                                                                 |
| 4              | 59.6                            | 2.5                 | 57.3                | 4.8                          | .478                             | .34                                              | .93                                                                 | .85                                                                 |
| 5              | 59.3                            | 2.2                 | 57.3                | 4.2                          | .478                             | .35                                              | .81                                                                 | .87                                                                 |
| 6              | 59.0                            | 2.0                 | 57.2                | 3.8                          | .476                             | .33                                              | .73                                                                 | .88                                                                 |
| 7              | 58.8                            | 2.1                 | 56.9                | 4.0                          | .472                             | .28                                              | .76                                                                 | .87                                                                 |
| 8              | 60.2                            | 2.3                 | 58.1                | 4.4                          | .491                             | .49                                              | .86                                                                 | .87                                                                 |
| 9              | 62.1                            | 4.0                 | 58.9                | 7.2                          | .504                             | .59                                              | 1.51                                                                | .79                                                                 |
| 10             | 63.2                            | 5.9                 | 58.5                | 10.6                         | .498                             | .48                                              | 2.30                                                                | .70                                                                 |
| 11             | 64.0                            | 7.6                 | 57.9                | 13.7                         | .488                             | .34                                              | 3.06                                                                | .64                                                                 |
| Noon.          | 64.4                            | 8.9                 | 57.3                | 16.0                         | .478                             | .22                                              | .62                                                                 | .59                                                                 |
| 1              | 64.7                            | 9.8                 | 57.8                | 16.7                         | .486                             | .29                                              | .89                                                                 | .58                                                                 |
| 2              | 65.1                            | 10.4                | 57.8                | 17.7                         | .486                             | .28                                              | 4.18                                                                | .56                                                                 |
| 3              | 65.1                            | 10.7                | 57.6                | 18.2                         | .483                             | .24                                              | .30                                                                 | .55                                                                 |
| 4              | 64.4                            | 10.3                | 57.2                | 17.5                         | .476                             | .18                                              | .05                                                                 | .56                                                                 |
| 5              | 64.9                            | 8.7                 | 58.8                | 14.8                         | .503                             | .48                                              | 3.45                                                                | .61                                                                 |
| 6              | 64.7                            | 6.4                 | 59.6                | 11.5                         | .516                             | .66                                              | 2.62                                                                | .68                                                                 |
| 7              | 64.5                            | 4.9                 | 60.6                | 8.8                          | .534                             | .87                                              | 1.99                                                                | .75                                                                 |
| 8              | 63.9                            | 4.3                 | 60.5                | 7.7                          | .532                             | .87                                              | .71                                                                 | .77                                                                 |
| 9              | 63.3                            | 3.8                 | 60.3                | 6.8                          | .528                             | .85                                              | .47                                                                 | .80                                                                 |
| 10             | 62.8                            | 3.4                 | 60.1                | 6.1                          | .525                             | .82                                              | .30                                                                 | .82                                                                 |
| 11             | 62.5                            | 3.0                 | 60.1                | 5.4                          | .525                             | .83                                              | .15                                                                 | .84                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January 1877.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 1½ ft. above Ground. | WIND.                 |                |                 | General aspect of the Sky.                                                                                             |
|-------|-----------------------|---------------------------------|-----------------------|----------------|-----------------|------------------------------------------------------------------------------------------------------------------------|
|       |                       |                                 | Prevailing direction. | Max. Pressure. | Daily Velocity. |                                                                                                                        |
|       | °                     | Inches                          |                       | lb             | Miles.          |                                                                                                                        |
| 1     | 123.0                 | ...                             | N N W & N             | ...            | 121.5           | B to 11 A. M., \i to 3, B to 11 P. M.                                                                                  |
| 2     | 127.5                 | ...                             | N & N N E             | ...            | 112.0           | B. Foggy at 9 P. M.                                                                                                    |
| 3     | 107.5                 | ...                             | S & S by W            | ...            | 48.0            | B.                                                                                                                     |
| 4     | 128.0                 | ...                             | S by E & S S W        | ...            | 68.4            | B to 7 A. M., \i to 12, \ to 5, B to 11 P. M.                                                                          |
| 5     | 127.5                 | ...                             | S by W & W S W        | ...            | 43.6            | B to 11 A. M., \i to 5, B to 11 P. M. Slightly foggy from 8 to 11 P. M.                                                |
| 6     | 123.0                 | ...                             | W S W & N by E        | ...            | 82.0            | B. Foggy at midnight.                                                                                                  |
| 7     | 127.8                 | ...                             | N by E & N            | ...            | 71.3            | B to 1, \i to 3, B to 11 P. M.                                                                                         |
| 8     | 114.8                 | ...                             | N & W by N            | ...            | 88.3            | B to 2, \i to 5, B to 11 P. M.                                                                                         |
| 9     | ...                   | ...                             | W by N & N            | ...            | 101.5           | B.                                                                                                                     |
| 10    | ...                   | ...                             | N & S S W             | ...            | 48.5            | B. Slightly foggy at 5 & 6 A. M. & 8 & 9 P. M.                                                                         |
| 11    | ...                   | ...                             | S S W & E             | ...            | 31.8            | B to 3, \i to 5, B to 11 P. M.                                                                                         |
| 12    | ...                   | 0.06                            | S by E & S            | ...            | 73.7            | B to 4 A. M., \i to 3, \i to 3, O to 11 P. M. Light R at 7 & 11 P. M.                                                  |
| 13    | Out of order          | 1.94                            | S E                   | ...            | 143.2           | O. T at 10½ A. M. R from Midnight to 4 P. M.                                                                           |
| 14    | ...                   | ...                             | ...                   | ...            | 174.6           | O to 5, B to 11 P. M. D at 7, 10 & 11 A. M.                                                                            |
| 15    | ...                   | ...                             | N by E                | ...            | 141.3           | B to 6 A. M., \i to 7, B to 11 P. M. Slightly foggy at 8 & 9 P. M.                                                     |
| 16    | ...                   | 0.03                            | N by E & N E          | ...            | 191.2           | B to 1, \i to 4, O to 10 A. M., \i to 3, \i to 5, B to 11 P. M. Slightly foggy at 7 & 8 P. M. Light R at 6 & 10½ A. M. |
| 17    | ...                   | ...                             | N by E, [N N W N W &  | ...            | 79.1            | B to 7 A. M., \i to 3, \i to 6, B to 11 P. M. Foggy from 5 to 7 A. M.                                                  |
| 18    | 128.3                 | ...                             | N N W & N             | ...            | 79.3            | B to 4 A. M., \i & \i to 5, B to 11 P. M. Slightly foggy from 8 to 11 P. M.                                            |

\i Cirri, —i Strati, \i Cumuli, \i Cirro-strati, \i Cumulo-strati, \i Nimbi, \i Cirro-cumuli, B clear, S strati, O overcast, T thunder, L lightning, R. rain, D. drizzle.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January 1877.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 1½ ft. above Ground. | WIND.                  |               |                 | General aspect of the Sky.                                                                                                       |
|-------|-----------------------|---------------------------------|------------------------|---------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
|       |                       |                                 | Prevailing direction.  | Max. Pressure | Daily Velocity. |                                                                                                                                  |
|       | °                     | Inches                          |                        | lb            | Miles.          |                                                                                                                                  |
| 19    | 129.0                 | ...                             | N & N by W             | ...           | 69.0            | B to 9 A. M., \i to 5, B to 11 P. M. Slightly foggy at Midnight & 1 A. M.                                                        |
| 20    | 129.7                 | ...                             | N & N W                | ...           | 108.5           | B to 6 A. M., \i & \i to 3, O to 11 P. M.                                                                                        |
| 21    | 127.8                 | ...                             | N W                    | ...           | 130.3           | \i to 7 A. M., B to 2, \i to 11 P. M. Slightly foggy at 10 & 11 P. M.                                                            |
| 22    | 127.7                 | ...                             | N N E & N E            | ...           | 112.3           | \i to 1, B to 5 A. M., \i to 11 P. M.                                                                                            |
| 23    | ...                   | ...                             | N W & W by S           | ...           | 103.9           | S to 7, \i to 9 A. M., O to 7, \i to 11 P. M. Slightly foggy from 8 to 11 P. M. D at 10, 11 A. M. & 12 P. M.                     |
| 24    | 129.5                 | ...                             | W by S & N E<br>[N N E | ...           | 58.9            | B. Slightly foggy from Midnight to 2 A. M. & at 7 P. M.                                                                          |
| 25    | 129.0                 | ...                             | N E, N N W &           | ...           | 118.2           | B. Slightly foggy at 10 & 11 P. M.                                                                                               |
| 26    | 126.5                 | ...                             | N N E, N W & W         | ...           | 102.7           | B to 6, \i to 8 A. M., \i to 4, \i to 6, O to 9, \i to 11 P. M. Slightly foggy at Midnight, 1 A. M. & 11 P. M.                   |
| 27    | 131.0                 | ...                             | W by N & W             | ...           | 60.4            | \i to 3 A. M., B to 6, \i to 11 P. M. Slightly foggy at Midnight & from 8 to 11 P. M.                                            |
| 28    | 134.0                 | ...                             | W & W by S             | ...           | 67.9            | \i to 11 A. M., \i to 7, B to 11 P. M. Slightly foggy at Midnight & 1 A. M.                                                      |
| 29    | 136.0                 | ...                             | W by S & S W           | ...           | 48.4            | \i & \i to 9 A. M., \i to 1, \i to 4, \i to 9, B to 11 P. M.                                                                     |
| 30    | 138.0                 | ...                             | S W & S S W            | ...           | 71.3            | B to 6, \i to 9, \i to 11 A. M., \i to 5, \i to 7, \i to 9, O to 11 P. M. Slightly foggy from 4 to 6 A. M. T, L & R at 11½ P. M. |
| 31    | 134.5                 | 0.87                            | S W & S S W            | 0.3           | 87.6            | O to 10 A. M., \i to 12, \i to 4, \i to 8, \i to 11 P. M. T & L at Midnight & 1 A. M. R from Midnight to 5½ A. M.                |

\i Cirri, —i Strati, \i Cumuli, \i Cirro-strati, \i Cumulo-strati, \i Nimbi, \i Cirro-cumuli, B clear, S straton, O overcast, T thunder, L lightning, R. rain, D. drizzle.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January 1877.*

MONTHLY RESULTS.

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|                                                                   | Inches. |
|-------------------------------------------------------------------|---------|
| Mean height of the Barometer for the month ... ..                 | 30.096  |
| Max. height of the Barometer occurred at 10 A. M. on the 16th ... | 30.301  |
| Min. height of the Barometer occurred at 4 P. M. on the 31st ...  | 29.908  |
| <i>Extreme range</i> of the Barometer during the month ...        | 0.393   |
| Mean of the daily Max. Pressures ... ..                           | 30.171  |
| Ditto ditto Min. ditto ... ..                                     | 30.040  |
| <i>Mean daily range</i> of the Barometer during the month ...     | 0.131   |

---

|                                                                 | °    |
|-----------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month ... ..                  | 67.7 |
| Max. Temperature occurred at 3 P. M. on the 30th ... ..         | 83.0 |
| Min. Temperature occurred at 7 A. M. on the 1st & 15th ... ..   | 57.5 |
| <i>Extreme range</i> of the Temperature during the month ... .. | 25.5 |
| Mean of the daily Max. Temperature ... ..                       | 76.1 |
| Ditto ditto Min. ditto, ... ..                                  | 60.7 |
| <i>Mean daily range</i> of the Temperature during the month ... | 15.4 |

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|                                                               |      |
|---------------------------------------------------------------|------|
| Mean Wet Bulb Thermometer for the month ... ..                | 62.5 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer ... | 5.2  |
| Computed Mean Dew-point for the month ... ..                  | 58.3 |
| Mean Dry Bulb Thermometer above computed mean Dew-point ...   | 9.4  |

|                                                   | Inches. |
|---------------------------------------------------|---------|
| Mean Elastic force of Vapour for the month ... .. | 0.494   |

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|                                                                        | Grain. |
|------------------------------------------------------------------------|--------|
| Mean Weight of Vapour for the month ... ..                             | 5.46   |
| Additional Weight of Vapour required for complete saturation ...       | 2.00   |
| Mean degree of humidity for the month, complete saturation being unity | 0.73   |

|                                                            | °     |
|------------------------------------------------------------|-------|
| Mean Max. Solar radiation Thermometer for the month ... .. | 128.4 |

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|                                                                                                      | Inches.      |
|------------------------------------------------------------------------------------------------------|--------------|
| Rained 7 days,—Max. fall of rain during 24 hours ... ..                                              | 1.94         |
| Total amount of rain during the month ... ..                                                         | 2.90         |
| Total amount of rain indicated by the Gauge* attached to the anemo-<br>meter during the month ... .. | out of order |
| Prevailing direction of the Wind ... ..                                                              | N & N W      |

\* Height 70 feet 10 inches above ground.

*Abstract of the Results of the Hourly Meteorological Observations taken at the S. G. O. Calcutta, in the month of Jan. 1877.*

MONTHLY RESULTS.

Tables shewing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

| Hour.    | N. | Rain on. | N. by E. | Rain on. | N. E. | Rain on. | E. by N. | Rain on. | E. | Rain on. | E. by S. | Rain on. | E. S. E. | Rain on. | S. E. | Rain on. | S. S. E. | Rain on. | S. by E. | Rain on. | S. | Rain on. | S. by W. | Rain on. | S. S. W. | Rain on. | S. W. | Rain on. | W. S. W. | Rain on. | W. by S. | Rain on. | W. | Rain on. | W. by N. | Rain on. | W. N. W. | Rain on. | N. W. | Rain on. | N. N. W. | Rain on. | N. by W. | Rain on. | Rain on. |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |
|----------|----|----------|----------|----------|-------|----------|----------|----------|----|----------|----------|----------|----------|----------|-------|----------|----------|----------|----------|----------|----|----------|----------|----------|----------|----------|-------|----------|----------|----------|----------|----------|----|----------|----------|----------|----------|----------|-------|----------|----------|----------|----------|----------|----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|
| Midnight | 4  | 3        | 1        | 1        | 1     | 1        | 1        | 1        | 1  | 1        | 1        | 1        | 1        | 1        | 1     | 1        | 1        | 1        | 1        | 1        | 1  | 1        | 1        | 1        | 1        | 1        | 1     | 1        | 1        | 1        | 1        | 1        | 1  | 1        | 1        | 1        | 1        | 1        | 1     | 1        | 1        | 1        | 1        | 1        | 1        | 1 | 1 | 1 | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |     |
| 1        | 4  | 3        | 3        | 3        | 3     | 3        | 3        | 3        | 3  | 3        | 3        | 3        | 3        | 3        | 3     | 3        | 3        | 3        | 3        | 3        | 3  | 3        | 3        | 3        | 3        | 3        | 3     | 3        | 3        | 3        | 3        | 3        | 3  | 3        | 3        | 3        | 3        | 3        | 3     | 3        | 3        | 3        | 3        | 3        | 3        | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3</ |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February 1877.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the sea level, 18.11 feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.939                                          | 30.001                                    | 29.888  | 0.113   | 72.7                          | 78.0                                          | 69.0 | 9.0   |
| 2     | .961                                            | .023                                      | .920    | .103    | 62.2                          | 68.5                                          | 58.6 | 9.9   |
| 3     | .949                                            | .015                                      | .902    | .113    | 64.5                          | 71.3                                          | 57.8 | 13.5  |
| 4     | .874                                            | .078                                      | .813    | .265    | 61.3                          | 65.0                                          | 56.0 | 9.0   |
| 5     | .883                                            | 29.950                                    | .828    | .122    | 64.2                          | 73.3                                          | 57.8 | 15.5  |
| 6     | .928                                            | .992                                      | .870    | .122    | 66.4                          | 73.0                                          | 61.5 | 11.5  |
| 7     | .926                                            | .986                                      | .845    | .141    | 65.4                          | 75.2                                          | 61.5 | 13.7  |
| 8     | .947                                            | 30.000                                    | .889    | .111    | 63.9                          | 68.5                                          | 60.5 | 8.0   |
| 9     | .993                                            | .050                                      | .933    | .117    | 66.3                          | 72.2                                          | 61.5 | 10.7  |
| 10    | 30.059                                          | .141                                      | 30.005  | .136    | 63.5                          | 71.0                                          | 56.5 | 14.5  |
| 11    | .089                                            | .127                                      | .009    | .118    | 64.1                          | 71.0                                          | 56.0 | 15.0  |
| 12    | .033                                            | .107                                      | 29.981  | .126    | 66.1                          | 73.2                                          | 59.5 | 13.7  |
| 13    | .054                                            | .120                                      | 30.008  | .112    | 66.7                          | 74.4                                          | 59.0 | 15.4  |
| 14    | .129                                            | .192                                      | .062    | .130    | 67.4                          | 74.5                                          | 59.8 | 14.7  |
| 15    | .140                                            | .223                                      | .084    | .139    | 66.8                          | 75.0                                          | 59.6 | 15.4  |
| 16    | .103                                            | .176                                      | .052    | .124    | 66.5                          | 75.2                                          | 58.0 | 17.2  |
| 17    | .111                                            | .187                                      | .054    | .133    | 66.5                          | 76.2                                          | 58.5 | 17.7  |
| 18    | .117                                            | .196                                      | .071    | .125    | 67.1                          | 76.4                                          | 57.8 | 18.6  |
| 19    | .127                                            | .192                                      | .080    | .112    | 67.4                          | 76.2                                          | 60.0 | 16.2  |
| 20    | .131                                            | .206                                      | .068    | .138    | 68.6                          | 78.6                                          | 59.0 | 19.6  |
| 21    | .096                                            | .163                                      | .028    | .135    | 69.9                          | 80.0                                          | 60.2 | 19.8  |
| 22    | .060                                            | .135                                      | .015    | .120    | 72.2                          | 81.4                                          | 63.0 | 18.4  |
| 23    | .028                                            | .110                                      | 29.972  | .138    | 74.0                          | 84.8                                          | 65.7 | 19.1  |
| 24    | .060                                            | .136                                      | 30.011  | .125    | 75.9                          | 84.5                                          | 69.0 | 15.5  |
| 25    | .080                                            | .173                                      | .004    | .169    | 74.6                          | 84.2                                          | 66.5 | 17.7  |
| 26    | .054                                            | .125                                      | .004    | .121    | 73.1                          | 83.2                                          | 63.6 | 19.6  |
| 27    | .035                                            | .119                                      | 29.991  | .128    | 73.3                          | 84.7                                          | 62.5 | 22.2  |
| 28    | .011                                            | .092                                      | .961    | .131    | 75.1                          | 86.0                                          | 66.0 | 20.0  |

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means, are derived, from the hourly observations, made at the several hours during the day.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February 1877.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Humi-<br>dity, complete satu-<br>ration being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | Gr.                                              | Gr.                                                                 |                                                                     |
| 1     | 67.9                            | 4.8                 | 64.1                | 8.6                          | 0.599                            | 6.55                                             | 2.13                                                                | 0.76                                                                |
| 2     | 59.2                            | 3.0                 | 56.5                | 5.7                          | .465                             | 5.20                                             | 1.09                                                                | .83                                                                 |
| 3     | 60.0                            | 4.5                 | 56.4                | 8.1                          | .461                             | .16                                              | .60                                                                 | .76                                                                 |
| 4     | 59.3                            | 2.0                 | 57.5                | 3.8                          | .481                             | .39                                              | 0.73                                                                | .88                                                                 |
| 5     | 60.6                            | 3.6                 | 57.4                | 6.8                          | .480                             | .33                                              | 1.36                                                                | .80                                                                 |
| 6     | 63.6                            | 2.8                 | 61.4                | 5.0                          | .548                             | 6.08                                             | .09                                                                 | .85                                                                 |
| 7     | 62.5                            | 2.9                 | 60.2                | 5.2                          | .527                             | 5.85                                             | .10                                                                 | .84                                                                 |
| 8     | 62.4                            | 1.5                 | 61.0                | 2.9                          | .511                             | 6.02                                             | 0.61                                                                | .91                                                                 |
| 9     | 62.8                            | 3.5                 | 60.0                | 6.3                          | .523                             | 5.80                                             | 1.35                                                                | .81                                                                 |
| 10    | 57.6                            | 5.9                 | 52.3                | 11.2                         | .404                             | 4.51                                             | 2.04                                                                | .69                                                                 |
| 11    | 58.2                            | 5.9                 | 52.9                | 11.2                         | .412                             | .60                                              | .07                                                                 | .69                                                                 |
| 12    | 60.7                            | 5.4                 | 56.4                | 9.7                          | .464                             | 5.14                                             | 1.96                                                                | .72                                                                 |
| 13    | 60.6                            | 6.1                 | 55.7                | 11.0                         | .453                             | .02                                              | 2.21                                                                | .69                                                                 |
| 14    | 60.5                            | 6.9                 | 55.0                | 12.4                         | .442                             | 4.90                                             | .49                                                                 | .66                                                                 |
| 15    | 59.5                            | 7.3                 | 53.7                | 13.1                         | .423                             | .69                                              | .57                                                                 | .65                                                                 |
| 16    | 58.4                            | 8.1                 | 51.9                | 14.6                         | .398                             | .41                                              | .78                                                                 | .61                                                                 |
| 17    | 58.0                            | 8.5                 | 51.2                | 15.3                         | .589                             | .32                                              | .87                                                                 | .60                                                                 |
| 18    | 59.3                            | 7.8                 | 53.1                | 14.0                         | .415                             | .60                                              | .72                                                                 | .63                                                                 |
| 19    | 59.2                            | 8.2                 | 52.6                | 14.8                         | .408                             | .51                                              | .88                                                                 | .61                                                                 |
| 20    | 60.6                            | 8.0                 | 54.2                | 14.4                         | .431                             | .75                                              | .92                                                                 | .62                                                                 |
| 21    | 62.9                            | 7.0                 | 57.3                | 12.6                         | .478                             | 5.25                                             | .73                                                                 | .66                                                                 |
| 22    | 65.6                            | 6.6                 | 60.3                | 11.9                         | .528                             | .79                                              | .76                                                                 | .68                                                                 |
| 23    | 67.9                            | 6.1                 | 63.6                | 10.4                         | .590                             | 6.44                                             | .60                                                                 | .71                                                                 |
| 24    | 69.7                            | 6.2                 | 65.4                | 10.5                         | .626                             | .80                                              | .77                                                                 | .71                                                                 |
| 25    | 65.1                            | 9.5                 | 58.4                | 16.2                         | .496                             | 5.40                                             | 3.80                                                                | .59                                                                 |
| 26    | 63.2                            | 9.9                 | 55.3                | 17.8                         | .447                             | 4.89                                             | .80                                                                 | .56                                                                 |
| 27    | 63.9                            | 9.4                 | 56.4                | 16.9                         | .464                             | 5.06                                             | .78                                                                 | .57                                                                 |
| 28    | 65.6                            | 9.5                 | 58.9                | 16.2                         | .504                             | .49                                              | .85                                                                 | .59                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February 1877.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer at<br>32° Fahr. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                             | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | °                             | °                                                                | °    | °     |
| Mid-<br>night. | 30.034                                          | 30.152                                                       | 29.898  | 0.254   | 65.0                          | 72.0                                                             | 59.3 | 12.7  |
| 1              | .023                                            | .146                                                         | .884    | .262    | 64.4                          | 71.3                                                             | 58.9 | 12.4  |
| 2              | .012                                            | .136                                                         | .873    | .263    | 63.8                          | 70.5                                                             | 58.4 | 12.1  |
| 3              | .001                                            | .132                                                         | .834    | .298    | 63.3                          | 70.2                                                             | 58.0 | 12.2  |
| 4              | 29.997                                          | .127                                                         | .815    | .312    | 62.7                          | 70.0                                                             | 57.5 | 12.5  |
| 5              | 30.012                                          | .142                                                         | .826    | .316    | 62.1                          | 69.6                                                             | 5.96 | 12.7  |
| 6              | .028                                            | .155                                                         | .831    | .324    | 61.5                          | 69.3                                                             | 56.0 | 13.3  |
| 7              | .049                                            | .169                                                         | .839    | .330    | 61.4                          | 69.7                                                             | 56.5 | 13.2  |
| 8              | .068                                            | .188                                                         | .856    | .332    | 63.2                          | 71.5                                                             | 58.0 | 13.5  |
| 9              | .089                                            | .206                                                         | .860    | .346    | 66.9                          | 73.8                                                             | 59.5 | 14.3  |
| 10             | .101                                            | .223                                                         | .914    | .309    | 69.8                          | 78.4                                                             | 60.5 | 17.9  |
| 11             | .098                                            | .212                                                         | .933    | .279    | 71.7                          | 80.8                                                             | 56.0 | 24.8  |
|                |                                                 |                                                              |         |         |                               |                                                                  |      |       |
| Noon.          | .068                                            | .188                                                         | .900    | .288    | 73.5                          | 82.5                                                             | 56.6 | 25.9  |
| 1              | .040                                            | .166                                                         | .864    | .302    | 74.3                          | 83.0                                                             | 57.8 | 25.2  |
| 2              | .014                                            | .126                                                         | .839    | .287    | 75.1                          | 84.8                                                             | 59.0 | 25.8  |
| 3              | 29.993                                          | .108                                                         | .813    | .295    | 75.3                          | 85.5                                                             | 58.8 | 26.7  |
| 4              | .985                                            | .106                                                         | .814    | .292    | 74.9                          | 86.0                                                             | 58.6 | 27.4  |
| 5              | .986                                            | .115                                                         | .828    | .287    | 74.2                          | 84.7                                                             | 59.0 | 25.7  |
| 6              | .995                                            | .125                                                         | .848    | .277    | 72.2                          | 82.0                                                             | 59.5 | 22.5  |
| 7              | 30.008                                          | .137                                                         | .871    | .266    | 70.0                          | 78.5                                                             | 60.0 | 18.5  |
| 8              | .027                                            | .151                                                         | .886    | .265    | 68.6                          | 77.0                                                             | 60.4 | 16.6  |
| 9              | .039                                            | .165                                                         | .896    | .269    | 67.4                          | 75.4                                                             | 60.0 | 15.4  |
| 10             | .045                                            | .162                                                         | .901    | .261    | 66.4                          | 74.2                                                             | 59.5 | 14.7  |
| 11             | .043                                            | .162                                                         | .899    | .263    | 65.6                          | 73.0                                                             | 59.5 | 13.5  |

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means, are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February 1877.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued).

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Gr.                                              | Gr.                                                                 |                                                                     |
| Mid-<br>night. | 61.9                            | 3.1                 | 59.4                | 5.6                          | .0513                            | 5.69                                             | 1.18                                                                | 0.83                                                                |
| 1              | 61.5                            | 2.9                 | 58.9                | 5.5                          | .503                             | .60                                              | .14                                                                 | .83                                                                 |
| 2              | 61.0                            | 2.8                 | 58.5                | 5.3                          | .498                             | .54                                              | .07                                                                 | .84                                                                 |
| 3              | 60.5                            | 2.8                 | 58.0                | 5.3                          | .489                             | .45                                              | .06                                                                 | .84                                                                 |
| 4              | 60.0                            | 2.7                 | 57.6                | 5.1                          | .483                             | .39                                              | .00                                                                 | .84                                                                 |
| 5              | 59.5                            | 2.6                 | 57.2                | 4.9                          | .476                             | .32                                              | 0.95                                                                | .85                                                                 |
| 6              | 59.1                            | 2.4                 | 56.9                | 4.6                          | .472                             | .27                                              | .89                                                                 | .86                                                                 |
| 7              | 58.9                            | 2.5                 | 56.6                | 4.8                          | .467                             | .23                                              | .91                                                                 | .85                                                                 |
| 8              | 59.7                            | 3.5                 | 56.5                | 6.7                          | .465                             | .19                                              | 1.30                                                                | .80                                                                 |
| 9              | 61.2                            | 5.7                 | 56.6                | 10.3                         | .467                             | .17                                              | 2.11                                                                | .71                                                                 |
| 10             | 61.9                            | 7.9                 | 55.6                | 14.2                         | .452                             | 4.98                                             | .97                                                                 | .63                                                                 |
| 11             | 62.5                            | 9.2                 | 55.1                | 16.6                         | .444                             | .87                                              | 3.56                                                                | .58                                                                 |
| Noon           | 62.9                            | 10.6                | 55.5                | 18.0                         | .450                             | .92                                              | .98                                                                 | .55                                                                 |
| 1              | 63.3                            | 11.0                | 55.6                | 18.7                         | .452                             | .93                                              | 4.19                                                                | .54                                                                 |
| 2              | 63.5                            | 11.6                | 55.4                | 19.7                         | .449                             | .88                                              | .46                                                                 | .52                                                                 |
| 3              | 63.7                            | 11.6                | 55.6                | 19.7                         | .452                             | .92                                              | .48                                                                 | .52                                                                 |
| 4              | 63.3                            | 11.6                | 55.2                | 19.7                         | .445                             | .85                                              | .43                                                                 | .52                                                                 |
| 5              | 63.4                            | 10.8                | 55.8                | 18.4                         | .455                             | .96                                              | .13                                                                 | .55                                                                 |
| 6              | 63.8                            | 8.4                 | 57.1                | 15.1                         | .475                             | 5.20                                             | 3.35                                                                | .61                                                                 |
| 7              | 63.9                            | 6.1                 | 59.0                | 11.0                         | .506                             | .56                                              | 2.44                                                                | .70                                                                 |
| 8              | 63.6                            | 5.0                 | 59.6                | 9.0                          | .516                             | .70                                              | 1.97                                                                | .74                                                                 |
| 9              | 63.0                            | 4.4                 | 59.5                | 7.9                          | .515                             | .69                                              | .70                                                                 | .77                                                                 |
| 10             | 62.5                            | 3.9                 | 59.4                | 7.0                          | .513                             | .68                                              | .49                                                                 | .79                                                                 |
| 11             | 62.1                            | 3.5                 | 59.3                | 6.3                          | .511                             | .67                                              | .33                                                                 | .81                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February 1877.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 1½ ft. above Ground. | WIND.                 |               |                 | General aspect of the Sky.                                                                                  |
|-------|-----------------------|---------------------------------|-----------------------|---------------|-----------------|-------------------------------------------------------------------------------------------------------------|
|       |                       |                                 | Prevailing direction. | Max. Pressure | Daily Velocity. |                                                                                                             |
|       | °                     | Inches                          |                       | lb            | Miles.          |                                                                                                             |
| 1     | 134.0                 | ...                             | S S W & N W           | ...           | 114.0           | ☾i & ☾i to 8, ☾i to 10 A. M., ☾i to 5, B to 8, ☾i to 11 P. M.                                               |
| 2     | ...                   | 0.29                            | N N E & S             | ...           | 113.6           | ☾i to 3 A. M., O to 7, B to 11 P. M. Slight R after intervals from 5 A. M. to 3 P. M.                       |
| 3     | 135.0                 | ...                             | S S W & E             | ...           | 41.9            | ☾i to 7 A. M., ☾i to 1, ☾i to 6, S to 11 P. M. D at 11½ P. M.                                               |
| 4     | ...                   | 0.62                            | E by N & E S E        | 7.9           | 161.0           | S to 2 A. M., O to 8, S to 11 P. M. T at 11 A. M. L at 11 A. M. & 11 P. M. R after intervals.               |
| 5     | 125.0                 | ...                             | N N W & N             | ...           | 105.6           | O to 9 A. M., ☾i to 12, B to 11 P. M. Slightly foggy from 9 to 11 P. M.                                     |
| 6     | 134.0                 | 0.05                            | N by W & E            | ...           | 76.1            | B to 3, ☾i to 6, O to 11 A. M., ☾i to 3, B to 11 P. M. Light R at 6½, 7½ & 8 A. M.                          |
| 7     | 129.0                 | 1.00                            | E S E & E N E         | 8.0           | 124.6           | B to 3 A. M., ☾i to 12, O to 4, ☾i to 6, B to 8. O to 11 P. M. R at 7½ A. M. & from 12½ to 4½ & at 11 P. M. |
| 8     | 86.0                  | 0.30                            | E by N & N W          | ...           | 199.8           | O to 8 A. M., ☾i to 12, O to 4, ☾i to 6, ☾i to 11 P. M. Slight R at 4½ from 6½ to 8, at 11 A. M. & 2½ P. M. |
| 9     | 132.8                 | ...                             | N W & N               | ...           | 87.8            | ☾i to 1, B to 9 A. M., ☾i to 5, B to 11 P. M. Slightly foggy at 9 & 10 P. M.                                |
| 10    | 126.5                 | ...                             | N & N by E            | ...           | 143.4           | B. Slightly foggy from 8 to 11 P. M.                                                                        |
| 11    | 129.0                 | ...                             | E, N E & W by N       | ...           | 105.0           | B to 11 A. M., ☾i to 1, ☾i to 3, ☾i to 6, O to 9, S to 11 P. M. Slightly foggy at Midnight.                 |
| 12    | 127.1                 | ...                             | W by N & E N E        | ...           | 40.0            | Chiefly B. Foggy from 9 to 11 P. M.                                                                         |
| 13    | 127.8                 | ...                             | ENE, NE & NNE         | ...           | 83.4            | B to 1, ☾i to 8, B to 11 P. M. Slightly foggy at Midnight.                                                  |

☾i Cirri, —i Strati, ☾i Cumuli, ☾i Cirro-strati, ☾i Cumulo-strati, ☾i Nimbi,  
☾i Cirro-cumuli, B clear, S strati, O overcast, T thunder, L lightning,  
R. rain, D. drizzle.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February 1877.*

## Solar Radiation, Weather, &amp;c.

| Date. | Max. Solar radiation. | Rain Gauge 1½ ft. above Ground. | WIND.                   |                |                 | General aspect of the Sky.                                       |
|-------|-----------------------|---------------------------------|-------------------------|----------------|-----------------|------------------------------------------------------------------|
|       |                       |                                 | Prevailing direction.   | Max. Pressure. | Daily Velocity. |                                                                  |
|       | °                     | Inches                          |                         | lb             | Miles.          |                                                                  |
| 14    | 133.5                 | ...                             | N N E & N N W           | ...            | 111.8           | B to 3, \i to 7 A. M., B to 1, \i to 5, \i to 8, B to 11 P. M.   |
| 15    | 130.0                 | ...                             | NNW, NE & NW            | ...            | 99.4            | B. Slightly foggy from 8 to 11 P. M.                             |
| 16    | 131.0                 | ...                             | N W & W by N            | ...            | 52.8            | B.                                                               |
| 17    | 131.0                 | ...                             | S W & W N W             | ...            | 76.9            | B. Foggy from 9 to 11 P. M.                                      |
| 18    | 130.4                 | ...                             | W N W & S W             | ...            | 72.3            | B. Slightly foggy at Mid-night, 1 A. M. 8 & 9 P. M.              |
| 19    | 132.0                 | ...                             | S W & W N W             | ...            | 92.3            | B.                                                               |
| 20    | 133.0                 | ...                             | W N W & W by N          | ...            | 66.1            | B. Slightly foggy from 8 to 11 P. M.                             |
| 21    | 133.0                 | ...                             | W by N & S S W          | ...            | 33.3            | Chiefly B. Slightly foggy from 7 to 10 P. M.                     |
| 22    | 134.4                 | ...                             | S by E & S by W         | ...            | 71.9            | B to 11 A. M., \i to 1, \i to 6, \i to 9, B to 11 P. M.          |
| 23    | 140.5                 | ...                             | S by W & S S W          | ...            | 92.3            | B to 8, \i to 11 A. M., \i to 2, \i to 5, \i to 11 P. M.         |
| 24    | 136.0                 | ...                             | S by W, S S W & [W by N | ...            | 98.5            | \i to 3, \i to 6, \i to 10 A. M., B to 2, \i to 4, B to 11 P. M. |
| 25    | 136.4                 | ...                             | N N E & W N W           | ...            | 91.2            | B. Slightly foggy at Mid-night, 1 A. M. & from 8 to 11 P. M.     |
| 26    | 137.0                 | ...                             | W N W & N W             | ...            | 138.3           | B. Slightly foggy from 8 to 10 P. M.                             |
| 27    | 137.3                 | ...                             | N W & W by N            | ...            | 108.6           | B.                                                               |
| 28    | 137.4                 | ...                             | W by N & W S W          | ...            | 100.8           | B.                                                               |

\i Cirri, —i Strati, \i Cumuli, \i Cirro-strati, ~i Cumulo-strati, \i Nimbi, \i Cirro-cumuli, B clear, S strati, O overcast, T thunder, L lightning, R. rain, D. drizzle.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February 1877.*

MONTHLY RESULTS.

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|                                                                   | Inches. |
|-------------------------------------------------------------------|---------|
| Mean height of the Barometer for the month ... ..                 | 30.032  |
| Max. height of the Barometer occurred at 10 A. M. on the 15th ... | 30.223  |
| Min. height of the Barometer occurred at 3 P. M. on the 4th ...   | 29.813  |
| <i>Extreme range</i> of the Barometer during the month ... ..     | 0.410   |
| Mean of the daily Max. Pressures ... ..                           | 30.108  |
| Ditto ditto Min. ditto ... ..                                     | 29.977  |
| <i>Mean daily range</i> of the Barometer during the month ... ..  | 0.131   |

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|                                                                    | °    |
|--------------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month ... ..                     | 68.0 |
| Max. Temperature occurred at 4 P. M. on the 28th ... ..            | 86.0 |
| Min. Temperature occurred at 6 A. M. on the 4th & 11th ... ..      | 56.0 |
| <i>Extreme range</i> of the Temperature during the month ... ..    | 30.0 |
| Mean of the daily Max. Temperature ... ..                          | 76.3 |
| Ditto ditto Min. ditto, ... ..                                     | 60.9 |
| <i>Mean daily range</i> of the Temperature during the month ... .. | 15.4 |

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|                                                                |      |
|----------------------------------------------------------------|------|
| Mean Wet Bulb Thermometer for the month ... ..                 | 62.0 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer ...  | 6.0  |
| Computed Mean Dew-point for the month ... ..                   | 57.2 |
| Mean Dry Bulb Thermometer above computed mean Dew-point ... .. | 10.8 |

|                                                   | Inches. |
|---------------------------------------------------|---------|
| Mean Elastic force of Vapour for the month ... .. | 0.476   |

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|                                                                        | Grain. |
|------------------------------------------------------------------------|--------|
| Mean Weight of Vapour for the month ... ..                             | 5.25   |
| Additional Weight of Vapour required for complete saturation ...       | 2.28   |
| Mean degree of humidity for the month, complete saturation being unity | 0.70   |

|                                                            | °     |
|------------------------------------------------------------|-------|
| Mean Max. Solar radiation Thermometer for the month ... .. | 130.7 |

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|                                                                                                      | Inches.     |
|------------------------------------------------------------------------------------------------------|-------------|
| Rained 7 days,—Max. fall of rain during 24 hours ... ..                                              | 1.00        |
| Total amount of rain during the month ... ..                                                         | 2.26        |
| Total amount of rain indicated by the Gauge* attached to the anemo-<br>meter during the month ... .. | 1.61        |
| Prevailing direction of the Wind ... ..                                                              | W N W & N W |

\* Height 70 feet 10 inches above ground.

*Abstract of the Results of the Hourly Meteorological Observations taken at the S. G. O. Calcutta, in the month of Feb. 1877.*

### MONTHLY RESULTS.

Tables shewing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

[illegible]

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March 1877.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the sea level, 18.11 feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 30.005                                          | 30.072                                    | 29.949  | 0.123   | 76.0                          | 87.0                                          | 66.0 | 21.0  |
| 2     | 29.975                                          | .052                                      | .923    | .129    | 76.5                          | 87.0                                          | 67.0 | 20.0  |
| 3     | 30.000                                          | .078                                      | .942    | .136    | 77.7                          | 88.0                                          | 67.5 | 20.5  |
| 4     | 29.920                                          | 29.988                                    | .843    | .145    | 77.5                          | 86.5                                          | 69.0 | 17.5  |
| 5     | .864                                            | .929                                      | .787    | .142    | 78.3                          | 86.5                                          | 73.5 | 13.0  |
| 6     | .880                                            | .942                                      | .804    | .138    | 79.2                          | 88.5                                          | 73.5 | 15.0  |
| 7     | .918                                            | .996                                      | .854    | .142    | 77.9                          | 88.0                                          | 68.5 | 19.5  |
| 8     | .934                                            | 30.004                                    | .860    | .144    | 79.0                          | 88.5                                          | 71.0 | 17.5  |
| 9     | .906                                            | 29.973                                    | .847    | .126    | 79.1                          | 87.2                                          | 71.5 | 15.7  |
| 10    | .880                                            | .947                                      | .798    | .149    | 80.1                          | 90.0                                          | 74.0 | 16.0  |
| 11    | .882                                            | .948                                      | .830    | .118    | 79.3                          | 88.8                                          | 71.5 | 17.3  |
| 12    | .905                                            | .967                                      | .864    | .103    | 80.0                          | 89.5                                          | 73.5 | 16.0  |
| 13    | .964                                            | 30.066                                    | .905    | .161    | 81.0                          | 88.5                                          | 76.2 | 12.3  |
| 14    | .964                                            | .027                                      | .899    | .128    | 81.5                          | 92.2                                          | 71.5 | 20.7  |
| 15    | .952                                            | .000                                      | .905    | .095    | 81.2                          | 90.5                                          | 74.6 | 15.9  |
| 16    | .944                                            | 29.999                                    | .905    | .094    | 76.9                          | 84.2                                          | 72.5 | 11.7  |
| 17    | .954                                            | 30.032                                    | .874    | .158    | 73.8                          | 83.0                                          | 66.5 | 16.5  |
| 18    | .933                                            | 29.986                                    | .854    | .132    | 77.3                          | 86.0                                          | 70.0 | 16.0  |
| 19    | .910                                            | .980                                      | .832    | .148    | 79.0                          | 88.0                                          | 71.8 | 16.2  |
| 20    | .863                                            | .929                                      | .791    | .138    | 80.7                          | 89.0                                          | 74.0 | 15.0  |
| 21    | 11.804                                          | .871                                      | .739    | .132    | 81.7                          | 90.0                                          | 76.0 | 14.0  |
| 22    | .778                                            | .836                                      | .725    | .111    | 83.4                          | 93.9                                          | 76.0 | 17.9  |
| 23    | .838                                            | .923                                      | .765    | .158    | 83.8                          | 93.8                                          | 77.0 | 16.8  |
| 24    | .833                                            | .940                                      | .801    | .148    | 83.1                          | 92.9                                          | 77.0 | 15.9  |
| 25    | .873                                            | .951                                      | .802    | .149    | 80.5                          | 88.0                                          | 76.4 | 11.6  |
| 26    | .878                                            | .953                                      | .807    | .146    | 81.3                          | 90.5                                          | 74.5 | 16.0  |
| 27    | .856                                            | .938                                      | .783    | .155    | 81.9                          | 90.0                                          | 76.4 | 13.6  |
| 28    | .837                                            | .957                                      | .772    | .185    | 78.3                          | 80.5                                          | 75.8 | 4.7   |
| 29    | .812                                            | .890                                      | .763    | .127    | 83.1                          | 92.2                                          | 76.3 | 15.9  |
| 30    | .892                                            | .949                                      | .836    | .113    | 78.3                          | 85.5                                          | 71.0 | 14.5  |
| 31    | .917                                            | 30.016                                    | .839    | .177    | 76.3                          | 81.2                                          | 74.0 | 7.2   |

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means, are derived, from the hourly observations, made at the several hours during the day.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March 1877.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Humi-<br>dity, complete satu-<br>ration being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | Gr.                                              | Gr.                                                                 |                                                                     |
| 1     | 64.9                            | 11.1                | 57.1                | 18.9                         | 0.475                            | 5.16                                             | 4.44                                                                | 0.54                                                                |
| 2     | 65.5                            | 11.0                | 57.8                | 18.7                         | .486                             | .27                                              | .48                                                                 | .54                                                                 |
| 3     | 66.8                            | 10.9                | 59.2                | 18.5                         | .509                             | .51                                              | .59                                                                 | .55                                                                 |
| 4     | 68.0                            | 9.5                 | 61.3                | 16.2                         | .546                             | .92                                              | .12                                                                 | .59                                                                 |
| 5     | 71.6                            | 6.7                 | 66.9                | 11.4                         | .657                             | 7.12                                             | 3.16                                                                | .69                                                                 |
| 6     | 73.4                            | 5.8                 | 69.3                | 9.9                          | .711                             | .67                                              | 2.89                                                                | .73                                                                 |
| 7     | 70.6                            | 7.3                 | 65.5                | 12.4                         | .628                             | 6.81                                             | 3.35                                                                | .67                                                                 |
| 8     | 72.8                            | 6.2                 | 68.5                | 10.5                         | .692                             | 7.48                                             | .02                                                                 | .71                                                                 |
| 9     | 74.6                            | 4.5                 | 71.4                | 7.7                          | .761                             | 8.22                                             | 2.31                                                                | .78                                                                 |
| 10    | 75.5                            | 4.6                 | 72.3                | 7.8                          | .783                             | .44                                              | .40                                                                 | .78                                                                 |
| 11    | 74.4                            | 4.9                 | 71.0                | 8.3                          | .751                             | .12                                              | .47                                                                 | .77                                                                 |
| 12    | 75.3                            | 4.7                 | 72.0                | 8.0                          | .776                             | .36                                              | .45                                                                 | .77                                                                 |
| 13    | 72.9                            | 8.1                 | 67.2                | 13.8                         | .664                             | 7.14                                             | 4.00                                                                | .64                                                                 |
| 14    | 71.3                            | 10.2                | 64.2                | 17.3                         | .601                             | 6.46                                             | .85                                                                 | .57                                                                 |
| 15    | 71.2                            | 10.0                | 64.2                | 17.0                         | .601                             | .46                                              | .75                                                                 | .58                                                                 |
| 16    | 69.5                            | 7.4                 | 64.3                | 12.6                         | .603                             | .55                                              | 3.31                                                                | .66                                                                 |
| 17    | 66.8                            | 7.0                 | 61.9                | 11.9                         | .557                             | .08                                              | 2.90                                                                | .68                                                                 |
| 18    | 71.4                            | 5.9                 | 67.3                | 10.0                         | .666                             | 7.22                                             | .76                                                                 | .72                                                                 |
| 19    | 72.5                            | 6.5                 | 67.9                | 11.1                         | .679                             | .34                                              | 3.16                                                                | .70                                                                 |
| 20    | 75.6                            | 5.1                 | 72.0                | 8.7                          | .776                             | 8.35                                             | 2.69                                                                | .76                                                                 |
| 21    | 77.4                            | 4.3                 | 74.4                | 7.3                          | .838                             | 9.02                                             | .35                                                                 | .79                                                                 |
| 22    | 77.4                            | 6.0                 | 73.2                | 10.2                         | .806                             | 8.64                                             | 3.32                                                                | .72                                                                 |
| 23    | 77.6                            | 6.2                 | 73.3                | 10.5                         | .809                             | .65                                              | .45                                                                 | .72                                                                 |
| 24    | 77.6                            | 6.5                 | 72.0                | 11.1                         | .776                             | .31                                              | .55                                                                 | .70                                                                 |
| 25    | 75.0                            | 5.5                 | 71.1                | 9.4                          | .753                             | .13                                              | 2.85                                                                | .74                                                                 |
| 26    | 72.9                            | 8.4                 | 67.0                | 14.3                         | .659                             | 7.10                                             | 4.14                                                                | .63                                                                 |
| 27    | 77.1                            | 4.8                 | 73.7                | 8.2                          | .819                             | 8.82                                             | 2.62                                                                | .77                                                                 |
| 28    | 73.9                            | 4.4                 | 70.8                | 7.5                          | .746                             | .07                                              | .21                                                                 | .79                                                                 |
| 29    | 73.3                            | 9.8                 | 66.4                | 16.7                         | .646                             | 6.93                                             | 4.93                                                                | .58                                                                 |
| 30    | 71.9                            | 6.4                 | 67.4                | 10.9                         | .668                             | 7.23                                             | 3.05                                                                | .70                                                                 |
| 31    | 70.5                            | 5.8                 | 66.4                | 9.9                          | .646                             | .03                                              | 2.66                                                                | .73                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March 1877.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer at<br>32° Fahr. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                             | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | °                             | °                                                                | °    | °     |
| Mid-<br>night. | 29.909                                          | 30.024                                                       | 29.786  | 0.238   | 75.6                          | 79.2                                                             | 71.5 | 7.7   |
| 1              | .901                                            | .018                                                         | .782    | .236    | 74.9                          | 79.0                                                             | 66.5 | 12.5  |
| 2              | .890                                            | .008                                                         | .772    | .236    | 74.4                          | 78.8                                                             | 67.0 | 11.8  |
| 3              | .880                                            | 29.998                                                       | .760    | .238    | 73.9                          | 78.3                                                             | 66.8 | 11.5  |
| 4              | .872                                            | .990                                                         | .742    | .248    | 73.7                          | 78.0                                                             | 66.6 | 11.4  |
| 5              | .885                                            | .998                                                         | .750    | .248    | 73.3                          | 77.8                                                             | 66.6 | 11.2  |
| 6              | .902                                            | 30.014                                                       | .760    | .254    | 72.9                          | 77.5                                                             | 66.4 | 11.1  |
| 7              | .923                                            | .033                                                         | .785    | .248    | 73.2                          | 78.0                                                             | 66.0 | 12.0  |
| 8              | .949                                            | .056                                                         | .808    | .248    | 75.4                          | 79.5                                                             | 68.5 | 11.0  |
| 9              | .964                                            | .078                                                         | .828    | .250    | 78.8                          | 83.5                                                             | 70.8 | 12.7  |
| 10             | .964                                            | .077                                                         | .832    | .245    | 81.3                          | 86.0                                                             | 74.0 | 12.0  |
| 11             | .955                                            | .068                                                         | .836    | .232    | 84.0                          | 89.5                                                             | 78.0 | 11.5  |
| •              |                                                 |                                                              |         |         |                               |                                                                  |      |       |
| Noon.          | .934                                            | .044                                                         | .811    | .233    | 85.9                          | 92.5                                                             | 77.6 | 14.9  |
| 1              | .906                                            | .013                                                         | .782    | .231    | 87.0                          | 93.7                                                             | 78.0 | 15.7  |
| 2              | .881                                            | 29.984                                                       | .766    | .218    | 87.3                          | 93.9                                                             | 72.5 | 21.4  |
| 3              | .858                                            | .959                                                         | .746    | .213    | 87.5                          | 93.6                                                             | 75.2 | 18.4  |
| 4              | .843                                            | .949                                                         | .734    | .215    | 87.2                          | 93.8                                                             | 78.2 | 15.6  |
| 5              | .841                                            | .954                                                         | .725    | .229    | 86.0                          | 91.7                                                             | 78.5 | 13.2  |
| 6              | .853                                            | .949                                                         | .727    | .222    | 83.7                          | 89.2                                                             | 76.5 | 12.7  |
| 7              | .863                                            | .962                                                         | .742    | .220    | 80.9                          | 85.0                                                             | 75.3 | 9.7   |
| 8              | .886                                            | .977                                                         | .766    | .211    | 79.2                          | 83.5                                                             | 74.5 | 9.0   |
| 9              | .907                                            | .999                                                         | .784    | .215    | 78.0                          | 82.4                                                             | 74.0 | 8.4   |
| 10             | .922                                            | 30.008                                                       | .796    | .212    | 77.1                          | 81.0                                                             | 73.0 | 8.0   |
| 11             | .919                                            | .016                                                         | .794    | .222    | 76.2                          | 80.0                                                             | 72.0 | 8.0   |

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb  
Thermometer Means, are derived from the observations made at the several  
hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
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in the month of March 1877.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued).

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | °                               | °                   | °                   | °                            | Inches.                          | Gr.                                              | Gr.                                                                 |                                                                     |
| Mid-<br>night. | 71.8                            | 3.8                 | 69.1                | 6.5                          | 0.706                            | 7.67                                             | 1.81                                                                | 0.81                                                                |
| 1              | 71.4                            | 3.5                 | 68.9                | 6.0                          | .701                             | .65                                              | .63                                                                 | .82                                                                 |
| 2              | 71.2                            | 3.2                 | 69.0                | 5.4                          | .704                             | .68                                              | .47                                                                 | .84                                                                 |
| 3              | 70.9                            | 3.0                 | 68.8                | 5.1                          | .699                             | .63                                              | .38                                                                 | .85                                                                 |
| 4              | 70.8                            | 2.9                 | 68.8                | 4.9                          | .699                             | .63                                              | .33                                                                 | .85                                                                 |
| 5              | 70.7                            | 2.6                 | 68.6                | 4.7                          | .695                             | .59                                              | .25                                                                 | .86                                                                 |
| 6              | 70.5                            | 2.4                 | 68.6                | 4.3                          | .695                             | .61                                              | .12                                                                 | .87                                                                 |
| 7              | 70.9                            | 2.3                 | 69.1                | 4.1                          | .706                             | .72                                              | .10                                                                 | .88                                                                 |
| 8              | 71.9                            | 3.5                 | 69.4                | 6.0                          | .713                             | .77                                              | .66                                                                 | .82                                                                 |
| 9              | 72.8                            | 6.0                 | 68.6                | 10.2                         | .695                             | .52                                              | 2.92                                                                | .72                                                                 |
| 10             | 73.1                            | 8.2                 | 67.4                | 13.9                         | .668                             | .18                                              | 4.06                                                                | .64                                                                 |
| 11             | 73.7                            | 10.3                | 66.5                | 17.5                         | .648                             | 6.93                                             | 5.24                                                                | .57                                                                 |
| Noon.          | 73.9                            | 12.0                | 65.5                | 20.4                         | .628                             | .70                                              | 6.17                                                                | .52                                                                 |
| 1              | 73.7                            | 13.3                | 65.7                | 21.3                         | .632                             | .73                                              | .56                                                                 | .51                                                                 |
| 2              | 73.5                            | 13.8                | 65.2                | 22.1                         | .621                             | .61                                              | .80                                                                 | .49                                                                 |
| 3              | 73.7                            | 13.8                | 65.4                | 22.1                         | .626                             | .64                                              | .85                                                                 | .49                                                                 |
| 4              | 73.9                            | 13.3                | 65.9                | 21.3                         | .636                             | .76                                              | .61                                                                 | .51                                                                 |
| 5              | 74.1                            | 11.9                | 65.8                | 20.2                         | .634                             | .76                                              | .15                                                                 | .52                                                                 |
| 6              | 74.2                            | 9.5                 | 67.5                | 16.2                         | .670                             | 7.18                                             | 4.89                                                                | .60                                                                 |
| 7              | 73.6                            | 7.3                 | 68.5                | 12.4                         | .692                             | .47                                              | 3.63                                                                | .67                                                                 |
| 8              | 73.2                            | 6.0                 | 69.0                | 10.2                         | .704                             | .60                                              | 2.96                                                                | .72                                                                 |
| 9              | 72.6                            | 5.4                 | 68.8                | 9.2                          | .699                             | .57                                              | .62                                                                 | .74                                                                 |
| 10             | 72.2                            | 4.9                 | 68.8                | 8.3                          | .699                             | .59                                              | .33                                                                 | .77                                                                 |
| 11             | 72.1                            | 4.1                 | 69.2                | 7.0                          | .708                             | .70                                              | 1.96                                                                | .80                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March 1877.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 1½ ft. above Ground. | WIND.                 |               |                 | General aspect of the Sky.                                                                                         |
|-------|-----------------------|---------------------------------|-----------------------|---------------|-----------------|--------------------------------------------------------------------------------------------------------------------|
|       |                       |                                 | Prevailing direction. | Max. Pressure | Daily Velocity. |                                                                                                                    |
|       |                       | Inches                          |                       | lb            | Miles.          |                                                                                                                    |
| 1     | 138.5                 | ...                             | W S W & N W           | ...           | 97.9            | B to 4, \i to 7, B to 11 P. M.                                                                                     |
| 2     | 140.5                 | ...                             | W N W & S W           | ...           | 111.5           | \i to 5, \i to 7 A. M., B to 11 P. M.                                                                              |
| 3     | 142.0                 | ...                             | N & S W               | ...           | 104.2           | B to 7, \i to 9 A. M., B to 1, \i to 6, B to 11 P. M.                                                              |
| 4     | 141.5                 | ...                             | S W                   | ...           | 82.8            | B to 7 A. M., \i to 8, S to 11 P. M.                                                                               |
| 5     | 144.0                 | ...                             | S W & S S W           | ...           | 102.2           | S to 6, O to 8, \i to 11 A. M., \i to 5, B to 11 P. M.                                                             |
| 6     | 141.7                 | 0.03                            | S by W & S S W        | 1.6           | 179.5           | O to 7 A. M., \i to 4, B to 6, S to 11 P. M. L from 6½ to 11 P. M. T at 7½, 10 & 11 P. M. Light R at 8 & 10½ P. M. |
| 7     | 142.0                 | ...                             | S S E & N W           | ...           | 204.0           | \i to 4, B to 11 P. M. L at Midnight, D at 7 & 8 A. M.                                                             |
| 8     | 144.0                 | ...                             | S S E & S by W        | ...           | 116.5           | B to 9, \i to 11 A. M., \i to 9, B to 11 P. M. Foggy from 3 to 7 A. M.                                             |
| 9     | 142.5                 | ...                             | S S W & S             | ...           | 148.4           | B to 4, S to 8 A. M., \i to 4, B to 11 P. M. Foggy at 6 & 7 A. M.                                                  |
| 10    | 144.0                 | 0.02                            | S & S S W             | ...           | 131.2           | B to 10 A. M., \i to 2, \i to 4, O to 7, \i to 11 P. M. T at 5½ P. M. L from 5½ to 10 P. M. Light R at 6 P. M.     |
| 11    | 146.0                 | ...                             | S by E & S S W        | ...           | 191.9           | B to 6, \i to 9 A. M., \i to 6, B to 11 P. M. Sheet L at 1 & 2 A. M., & from 7 to 9 P. M.                          |
| 12    | 143.0                 | ...                             | S by W & S S W        | ...           | 195.5           | B to 10 A. M., \i to 7, B to 11 P. M. Sheet L on N W at 7 P. M.                                                    |
| 13    | 144.7                 | ...                             | S by W & W S W        | 1.0           | 164.5           | S to 3, \i to 6, \i to 11 A. M., \i to 6, B to 11 P. M.                                                            |
| 14    | 143.0                 | ...                             | W S W & W by N        | ...           | 142.4           | \i to 1 A. M., B to 1, \i to 6, B to 11 P. M.                                                                      |
| 15    | 145.5                 | ...                             | WSW, SW & NW          | ...           | 127.5           | B to 5, \i to 7 A. M., \i to 3, \i to 6, S to 11 P. M.                                                             |

\i Cirri, —i Strati, \i Cumuli, \i Cirro-strati, \i Cumulo-strati, \i Nimbi, \i Cirro-cumuli, B clear, S strati, O overcast, T thunder, L lightning, R. rain, D. drizzle.

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in the month of March 1877.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 1½ ft. above Ground. | WIND.                 |               |                 | General aspect of the Sky.                                                                                          |
|-------|-----------------------|---------------------------------|-----------------------|---------------|-----------------|---------------------------------------------------------------------------------------------------------------------|
|       |                       |                                 | Prevailing direction. | Max. Pressure | Daily Velocity. |                                                                                                                     |
|       | °                     | Inches                          |                       | lb            | Miles.          |                                                                                                                     |
| 16    | 140.0                 | ...                             | Variable              | ...           | 139.2           | O to 10 A. M., \i to 12, O to 5, \i to 7, S to 11 P. M. Sheet L from 7 to 11 P. M. D at 6 A. M. & 8½ P. M.          |
| 17    | 139.5                 | 0.70                            | ...                   | 40.0          | 158.5           | O to 4, B to 9 A. M., \i to 1, B to 11 P. M. T. L & hailstone at Midnight. R at Midnight & 1 A. M.                  |
| 18    | 143.0                 | ...                             | ...                   | ...           | 82.4            | B to 8 A. M., \i to 6, B to 11 P. M.                                                                                |
| 19    | 149.0                 | ...                             | S S W & S by W        | ...           | 114.0           | B to 8 A. M., \i to 6, B to 11 P. M.                                                                                |
| 20    | 146.0                 | ...                             | S by W & S            | ...           | 131.0           | B to 8 A. M., \i to 4, B to 11 P. M. D at 4 P. M.                                                                   |
| 21    | 142.0                 | ...                             | S by W, SSW & S       | 0.3           | 255.0           | Chiefly B.                                                                                                          |
| 22    | 146.3                 | ...                             | S by W & S S W        | 0.2           | 250.2           | B to 9 A. M., \i to 2, \i to 5, B to 11 P. M.                                                                       |
| 23    | 143.0                 | ...                             | S S W & S W           | ...           | 244.3           | B to 5, \i to 8, \i to 11 A. M., B to 1, \i to 4, B to 11 P. M.                                                     |
| 24    | 144.8                 | ...                             | S S W & S W           | 9.5           | 186.6           | B to 5, Scuds to 9 A. M., \i to 1, B to 3, \i to 7, O to 11 P. M. L at 8 & 9 P. M. T at 9 P. M., D at 10 & 11 P. M. |
| 25    | 147.5                 | ...                             | S S W & S W           | 0.2           | 164.9           | O to 1, S to 6 A. M., \i to 12, S to 4, O to 6, \i to 11 P. M. D at Midnight, & 3½ P. M.                            |
| 26    | 143.0                 | ...                             | S by W                | ...           | 15 C.3          | \i to 11 A. M., B to 2, \i to 7, \i to 11 P. M.                                                                     |
| 27    | 147.0                 | ...                             | S by W & S S W        | ...           | 97.7            | \i to 6, O to 10 A. M., \i to 5, \i to 11 P. M.                                                                     |
| 28    | 127.0                 | ...                             | S S W                 | ...           | 85.4            | \i to 6 A. M., O to 3, \i to 11 P. M. D at 8, 10 A. M., 12 & 1 P. M.                                                |
| 29    | 143.2                 | ...                             | S S W & W             | ...           | 111.3           | \i to 4, O to 6, \i to 11 A. M., B to 2, \i to 7, \i to 11 P. M. Sheet L on S W at 7½ P. M. D at 9½ P. M.           |

\i Cirri, —i Strati, \i Cumuli, \i Cirro-strati, \i Cumulo-strati, \i Nimbi, \i Cirro-cumuli, B clear, S strati, O overcast, T thunder, L lightning, R. rain, D. drizzle.

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Solar Radiation, Weather, &c.,

| Date. | Max. Solar radiation. | Rain Gauge 1½ ft. above Ground. | WIND.                 |               |                 | General aspect of the Sky.                                                                                                                                    |
|-------|-----------------------|---------------------------------|-----------------------|---------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |                       |                                 | Prevailing direction. | Max. Pressure | Daily Velocity. |                                                                                                                                                               |
|       | <sup>o</sup>          | Inches.                         |                       | lb            | Miles.          |                                                                                                                                                               |
| 30    | 146.0                 | 0.12                            | S & S S W             | 6.3           | 144.2           | O to 10 A. M., $\searrow$ i to 1. O to 3, $\searrow$ i to 8, O to 11 P. M. T at 1 & 2 A. M., L from 1 to 3 A. M. & at 9 & 10 P. M. Slight R from 1 to 3 A. M. |
| 31    | 128.0                 | 0.01                            | S S W & S E           | 6.2           | 152.2           | O to 9 A. M., $\searrow$ i to 12, O to 2, $\searrow$ i to 5, O to 11 P. M. T at 9 P. M. L from 8 to 11 P. M. Light R at 3, 9½ A. M. & 1½ P. M.                |

$\searrow$  i Cirri — i Strati,  $\searrow$  i Cumuli,  $\searrow$  i Cirro-strati,  $\searrow$  i Cumulo-strati,  $\searrow$  i Nimbi,  
 $\searrow$  i Cirro-cumuli, B clear, S strati, O overcast, T thunder, L lightning,  
R. rain, D. drizzle.

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## MONTHLY RESULTS.

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|                                                                  | Inches. |
|------------------------------------------------------------------|---------|
| Mean height of the Barometer for the month ... ..                | 29.900  |
| Max. height of the Barometer occurred at 9 A. M. on the 3rd ...  | 30.078  |
| Min. height of the Barometer occurred at 5 P. M. on the 22nd ... | 29.725  |
| <i>Extreme range</i> of the Barometer during the month ...       | 0.353   |
| Mean of the daily Max. Pressures ... ..                          | 29.973  |
| Ditto ditto Min. ditto ... ..                                    | 29.835  |
| <i>Mean daily range</i> of the Barometer during the month ...    | 0.138   |

---

|                                                                 | °    |
|-----------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month ... ..                  | 79.5 |
| Max. Temperature occurred at 2 P. M. on the 22nd ...            | 93.9 |
| Min. Temperature occurred at 7 A. M. on the 1st ...             | 66.0 |
| <i>Extreme range</i> of the Temperature during the month ...    | 27.9 |
| Mean of the daily Max. Temperature ... ..                       | 88.2 |
| Ditto ditto Min. ditto, ... ..                                  | 72.7 |
| <i>Mean daily range</i> of the Temperature during the month ... | 15.5 |

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|                                                               |      |
|---------------------------------------------------------------|------|
| Mean Wet Bulb Thermometer for the month ... ..                | 72.5 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer ... | 7.0  |
| Computed Mean Dew-point for the month ... ..                  | 67.6 |
| Mean Dry Bulb Thermometer above computed mean Dew-point ...   | 11.9 |

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|                                                   | Inches. |
|---------------------------------------------------|---------|
| Mean Elastic force of Vapour for the month ... .. | 0.672   |

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|                                                                        | Grain. |
|------------------------------------------------------------------------|--------|
| Mean Weight of Vapour for the month ... ..                             | 7.26   |
| Additional Weight of Vapour required for complete saturation ...       | 3.40   |
| Mean degree of humidity for the month, complete saturation being unity | 0.68   |

|                                                            | °     |
|------------------------------------------------------------|-------|
| Mean Max. Solar radiation Thermometer for the month ... .. | 142.5 |

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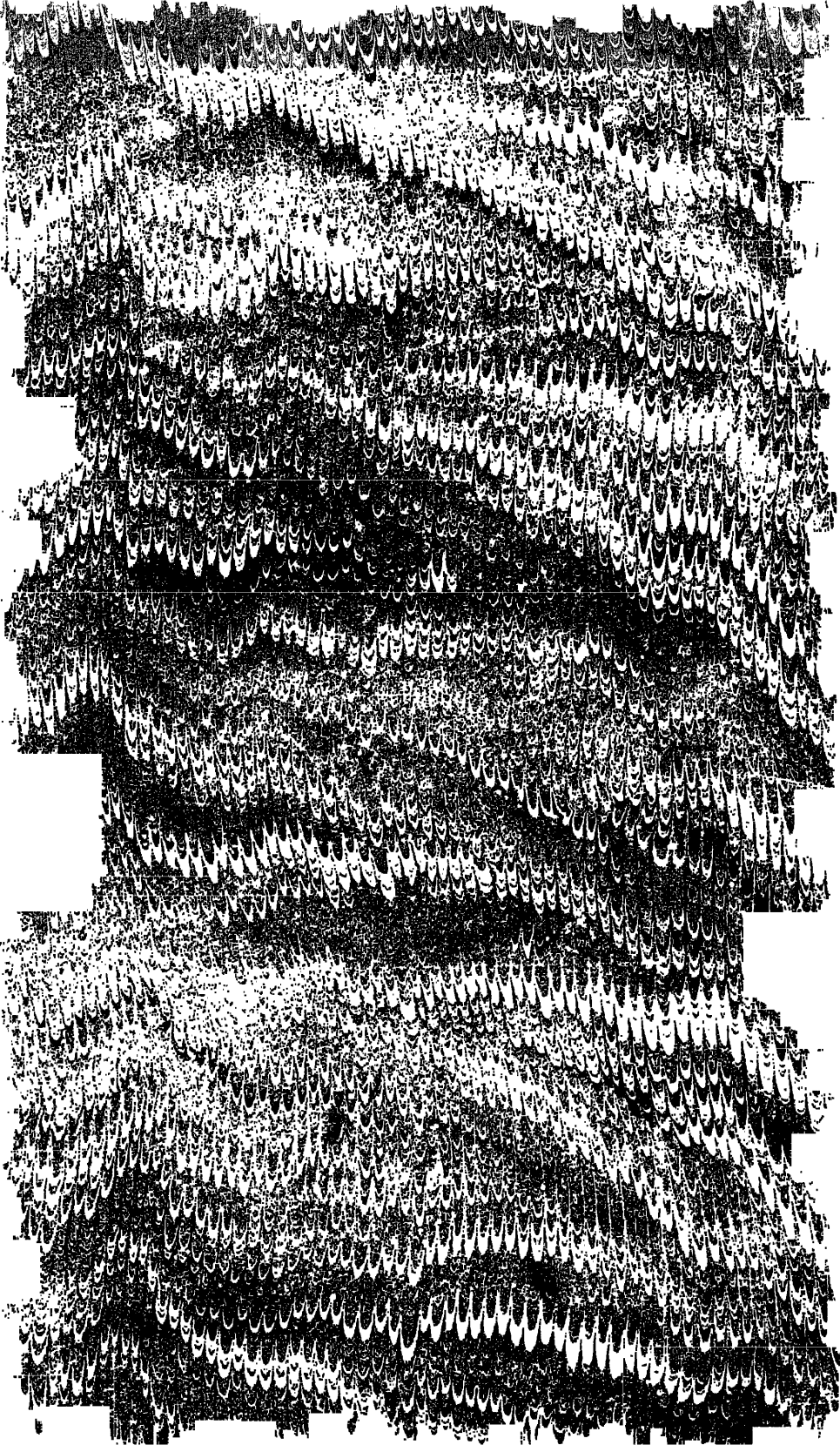
|                                                                                                      | Inches.        |
|------------------------------------------------------------------------------------------------------|----------------|
| Rained 12 days,—Max. fall of rain during 24 hours ... ..                                             | 0.70           |
| Total amount of rain during the month ... ..                                                         | 0.88           |
| Total amount of rain indicated by the Gauge* attached to the anemo-<br>meter during the month ... .. | 0.58           |
| Prevailing direction of the Wind ... ..                                                              | S S W & S by W |

\* Height 70 feet 10 inches above ground.

Tables shewing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

[illegible]





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